HYDRAULIC FRACTURING AS TECHNOLOGICAL HAZARD:

APPLYING THE COMMUNITY CAPITALS FRAMEWORK TO STAKEHOLDER NARRATIVES IN AN OIL AND GAS COMMUNITY

By

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Abstract: The current literature on hydraulic fracturing is largely survey based, addressing public assessments of the technology in broad strokes. This study draws on pertinent studies in disaster literature and the community capitals framework, to employ qualitative methodologies to gain an in-depth understanding of how extraction related technological innovations are affecting a rural Oklahoma community. Data for this research consist of 33 semi-structured interviews with community stakeholders, 146 local newspaper articles and editorials, and field notes of community-based meetings. Interviews and articles were coded and analyzed using the community capitals framework. Results consider the existence of multiple cultural capitals within the community, which also correspond to how stakeholders construct risk associated with nearby oil and gas activity.

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CHAPTER I

INTRODUCTION

The most recent onshore oil and gas boom in the United States is the result of enhanced resource extraction technology and national initiatives focused on U.S. energy independence implemented over the past decade. One such technology is hydraulic fracturing (HF), a practice used in various parts of the mid-west since the 1940s. Until the early 2000s, hydraulic fracturing was applied to traditional vertical oil and gas wells, confining the well stimulation process to the area directly around the vertical wellbore. Recent technological advancements have led to a tremendous increase in oil and gas production as hydraulic fracturing has been paired with horizontal drilling, allowing operators to stimulate wellbores extending horizontally for upwards of four-thousand feet in multiple directions. The pairing of such technologies has led to heightened concerns for residents living near production sites. Over the past five years, enhanced fracturing technology has created greater economic, social, environmental, and political impacts as operations have increasingly encroached on residential areas. It is estimated that as of 2014 more than fifteen million Americans live within one mile of an oil and gas operation (Webb et al. 2014).

Common concerns expressed by stakeholders relate to the increased prevalence of oil and gas production (often a mixture of traditional vertical wells and the new horizontal operations) and range from nuisances such as loud noise, bright lights, heavy truck traffic, and foul odors, to serious health issues such as toxic exposure from water contamination and air pollution (Anderson and Theodori 2009; Boudet et al 2013; Ladd 2014; Stedman et al 2012; Theodori 2009; Theodori 2013; Wynveen 2011). Growing concern regarding the safety of people and the environment has been at the heart of the hydraulic fracturing controversy as communities are forced to weigh potential economic benefits against the growing concerns of environmental, health, and social impacts. The tension surrounding competing perceptions of the increased proximity of oil and gas activity to residential neighborhoods may enhance existing social fault lines within a community. The issue is further complicated by the shroud of mystery surrounding the proprietary chemicals used in operations as well as other regulatory exemptions tailored specifically to hydraulic fracturing through federal and state level legislation.

In the United States, oil and gas activity is largely regulated at the state level. Therefore community resilience from oil and gas hazards may vary widely based on region, potentially creating problems for communities in "energy patch states," as such states may be more likely to act as industry promoters rather than champions of public health and safety (Davis 2012; Hagström and Adams 2012; Heikkila et al 2014). In light of public concern and emerging research, numerous cities, municipalities, counties, and states have enacted zoning regulations, moratoriums, and bans over the past several years in an attempt to mitigate risks related to hydraulic fracturing. Alternatively, other states have sought to limit the power of municipalities to enact ordinances effecting oil and gas exploration in their jurisdictions.

Surprisingly, only one study (Jacquet 2014) thus far has referred to oil and gas exploration and the use of hydraulic fracturing as a technological hazard. A technological hazard is the presence of a manmade technology with the potential to contaminate the biosphere if an

accident or triggering event should occur (Erikson 1994; Gill and Picou 1998; Godschalk 2007; Kroll-Smith and Couch 1993; Short 1984; Tierney 2014). Due to the exempt nature of oil and gas exploration from federal oversight and the secrecy surrounding the chemicals used in the process, oil and gas operations utilizing hydraulic fracturing may be considered a unique category of technological hazard. Numerous studies from the disaster literature have shown that when technological hazards become emergency situations, communities often face considerable adverse consequences including health problems, psychological stress, social corrosion, ongoing litigation, as well as loss of political and institutional trust (Cuthbertson and Nigg 1987; Freudenberg 1993; Gill 1994; Freudenberg and Gramling 1994; Gill and Picou 1998; Kroll-Smith and Couch 1993; Short 1984; Tierney 2014).

To date, the majority of literature concerning hydraulic fracturing involves public perception research and proxy health studies, relying on quantitative methodologies (Anderson and Theodori 2009; Boudet et al. 2013; Clarke et al. 2015; Colborn et al. 2011; Goldstein 2014; Gross et al. 2013; Heuer and Chih Lee 2014; Jacquet 2014; Kriesky et al. 2013; McKenzie et al. 2014; Rabe and Borick 2011; Rabinowitz et al. 2015; Schafft Borlu and Glenna 2013; Stedman et al. 2012; Theodori 2009; Theodori 2013; Theodori et al. 2014; Webb et al. 2014; Wynveen 2011). Despite the concern surrounding communities located near oil and gas operations, a dearth of research exists examining the nuances of how hydraulic fracturing affects communities. Applying a framework such as community capitals to the experiences of residents in areas impacted by oil and gas extraction may be an effective approach for understanding local processes.

The Community Capitals Framework was developed by Flora and Flora (2008) to examine the sustainability of rural communities, but has been increasingly applied to other research agendas (Goreham 2013; Ritchie and Gill 2011; Stofferahn 2012). Community capitals are delineated as seven categories of resources and assets people and/or communities possess

(Flora and Flora 2008; Gutierrez-Montes, Emery, and Fernandez-Baca 2009) and include: natural, cultural, social, human, political, built, and financial capitals. The community capitals framework highlights interdependence, interaction, and synergy among the capitals, as use of the assets in one capital can have a positive or negative impact on other capitals (Emery & Flora 2006; Gutierrez-Montes Emery and Fernandez-Bach 2009; Stofferahn 2012). Understanding the stock and flow of capital in particular communities is believed to be instrumental in gaining a systematic understanding of particular communities within broader geographic and socio-historic contexts. The community capitals framework was developed to identify problem areas in rural communities for the purposes of development, however, it is increasingly being utilized in disaster research to increase community resiliency and mitigate vulnerability to natural hazards (Goreham 2013; Ritchie and Gill 2011; Stofferahn 2012). Due to the frameworks utility, it may be used to examine and compare, as well as identify problem areas, and inform response and mitigation efforts in communities located near oil and gas operations.

This study seeks to gain a better understanding of how hydraulic fracturing affects a specific community through the application of the community capitals framework to stakeholder's narratives regarding their perceptions, beliefs, and behaviors within the larger community context. Stillwater, Oklahoma, a community in the Midwest located near oil and gas operations will be examined to gain an understanding of how nearby oil and gas exploration has affected various stakeholder groups. I triangulate stakeholder interviews with local media coverage and participant observation to capture the nuances of a community surrounded by intense drilling operations. Couched in the discussion of technological hazards, this study explores the degree to which social issues associated with technological hazards, such as corrosive community emerge in areas where hydraulic fracturing is practiced. To date, no emergency has occurred in the community under study, therefore the objective is to gauge the

degree to which symptoms of contaminated communities exist in a region where hydraulic fracturing is underway.

Drawing on technological hazard research while utilizing the community capitals framework, I propose the following research questions: Do stakeholders view hydraulic fracturing and associated oil and gas activity as a technological risk or hazard? Does the region's historical association with the oil and gas industry influence perceptions of hydraulic fracturing and stakeholder construction of risk? In what ways can the community capitals framework be implemented to make sense of stakeholder narratives? The community capitals framework may prove to be a more systematic way of analyzing and comparing communities facing similar circumstances, providing us with deeper insight as to why outcomes may vary based on location. Also, because this framework includes the cultural capital dimension, it may prove to better capture and contextualize the first two research questions for this study, allowing for a comparison of these dimensions with similar communities.

In Chapter II, I offer a literature review and discussion of the community capitals framework and its utility for a variety of research agendas, especially research related to technological hazards and disaster response. I then address hydraulic fracturing as a technological hazard, drawing on current research and pertinent disaster literature to demonstrate that the increased prevalence of oil and gas extraction using enhanced technology may be constructed as such. In Chapter III I describe the research design and the stakeholder sample, including insights into the limitations of this study. In Chapter IV I describe the political and social context of the case study community, and begin to construct cultural capital categories from the narratives. I then draw on the constructed categories and observed patterns to address how stakeholders construct risk associated with oil and gas activity. In Chapter V, I transition into proximity issues and rural industrialization, describing stakeholder's perceptions of mineral rights and the associated tensions. Finally, in Chapter VI and VII, I offer discussions and conclusions and

consider how the community capitals framework may be applied overall, ending with suggestions for future research.

CHAPTER II

LITERATURE REVIEW

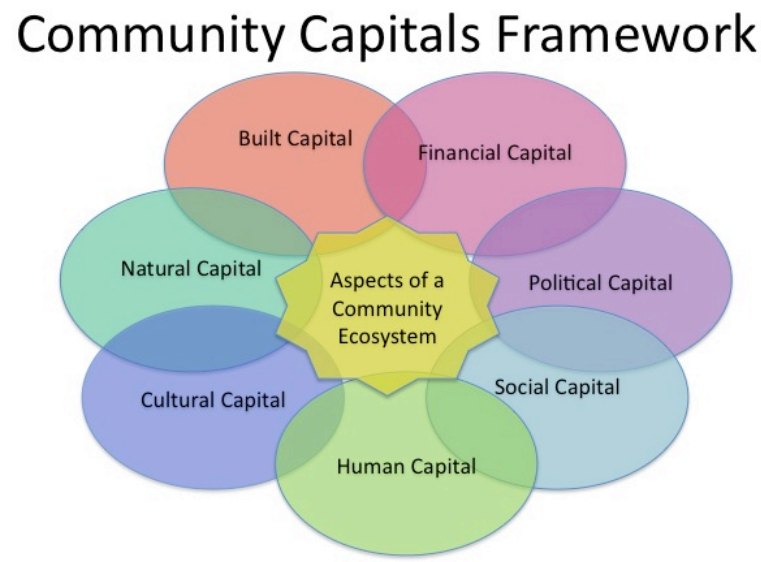
This project draws theoretical grounding from two bodies of literature: hydraulic fracturing studies and technological hazard and disaster scholarship. Although hydraulic fracturing has all the attributes of a technological hazard, currently no studies exist that discuss hydraulic fracturing technology as such. To date the hydraulic fracturing literature has largely been comprised of large-scale survey research, and is in need of more in-depth and nuanced efforts at the stakeholder level. The goal of this study is to fill this gap with an in-depth examination of stakeholder narratives from a region experiencing intense oil and gas activity. I begin by discussing the community capitals framework in response to the recent call of disaster researchers for enhanced use of the framework. I describe each of the capitals separately and discuss how their application to the case study community may be a contribution to both the disaster and hydraulic fracturing literatures. Next, I consider the technological hazard and disaster literature in application to hydraulic fracturing technology, and consider connections to communities experiencing intense oil and gas exploration. Finally, I discuss how the community capitals framework may be applied in this study, exploring what I believe will emerge as the most prominent capitals based on existing literatures.

Community Capitals

According to Flora and Flora (2008) community capitals is a conceptual model that provides a way to holistically inventory community resources by parsing them out into seven categories. When community resources, or assets, are invested to create new resources, they become a form of capital within a given community. However, "when one capital is emphasized over all others, the other resources are *decapitalized*, and the economy, environment, or social equity is thus compromised" (Flora and Flora 2008:15). Thus, a balance or synergy between community resources is essential in order to create a sustainable healthy community. Community development research suggests that shifting investments in capitals can potentially lead to a spiraling up or spiraling down of community assets (Emery and Flora 2006; Flora and Flora 2008; Gutierrez-Montes Emery and Fernandez-Baca 2009; Gutierrez-Montes et al 2009). According to Emery and Flora (2006) the community capitals approach offers a new viewpoint from which to analyze holistic community changes, encouraging us to think systematically about strategies and projects.

Identifying the capitals present in a community and their relationships with one another can be vital to understanding community processes and outcomes. As mentioned, there are seven categories of community capitals; natural, cultural, social, human, political, built, and financial. The model depicted in Figure 1 outlines the intersections between each capital.

Figure 1.



Source: Community Capitals Framework & Sustainable Communities,
Cornelia Butler Flora, Rural Studies Research Seminar, July 4, 2006, University of Guelph

Natural capital encompasses air, water, soil, biodiversity, and weather patterns. It provides both possibilities and limits to communities and is influenced by human activities. For example, Gutierrez-Montes, Emery and Fernandez-Baca (2009) assert that most rural communities depend directly on local natural resources to maintain their livelihoods, however conditions of poverty often encourage local communities to exhaust their assets at the expense of long-term sustainability, inciting a downward spiral of increased environmental degradation and poverty. Therefore, the type of natural capital within a community and how it is utilized may have long-term impacts on the other capitals, either compromising or enhancing the community's overall sustainability.

Cultural capital determines one's worldview, such as values and what one thinks are possible to change (Flora and Flora 2008). It essentially refers to the way people "know the world" and influences what voices are heard and listened to (Emery and Flora 2006). Some

scholars suggest that natural capital shapes the cultural capital of a place (Constanza et al 1997; Pretty 1998), while Flora and Flora (2008) note that the prevailing cultural capital of a place is often a reflection of the dominant group. Stofferahn (2012) asserts that cultural capital is key to mobilizing social capital, as cultural capital determines how a community engages in collective action. "In short, cultural capital defines the social construction of a collective response: it determines how social, human, and political capitals are operationalized and mobilized" (Stofferahn 2012:594). Therefore, understanding the prevailing cultural capital of a community may be crucial in understanding the response, or lack thereof, to the looming presence of a hazard.

Social capital involves mutual trust, reciprocity networks, groups, collective identity, and a sense of a shared future (Bourdieu 1986; Coleman 1988; Flora and Flora 2008; Putnam 1993). Emery and Flora (2006) studied a community in rural Nebraska, and concluded that the best entry point for reversing the downward spiral of decaptialized community assets was through social capital. Through social capital they were able to recruit human capital, which brought about financial capital, and the eventual shifting of political and cultural capital within the community. Gutierrez-Montes et al. (2009) utilized the community capitals framework in a participatory action research project in Central America to help community members across multiple communities see their region as a system, strengthening social capital between and among communities. Stofferahn (2012) applied the community capitals framework to a community's disaster recovery efforts following an EF 4 tornado, concluding social capital, in addition to human and cultural capitals, were key to mobilizing political and financial capital. Social capital has also been identified as key to response and recovery efforts after natural disasters (Aldrich and Meyer 2014; Stofferahn 2012), and of particular importance in technological disasters due to the breakdown of social ties and loss of institutional trust within contaminated communities (Ritchie and Gill 2011).

Political capital is the ability of a community group to turn their norms and values into standards, rules, and regulations (Flora and Flora 2008). It also refers to the ability of people to find their own voice and to engage in actions that contribute to the well-being of their community (Aigner et al. 2001; Emery and Flora 2006). According to Flora and Flora (2008) political capital generally reflects the dominant cultural capital, as many rural communities have high levels of bonding social capital which reinforce the status quo and discourage groups with different ideas and agendas from coming forward to offer alternatives. "Rule setters are viewed as the enemy, interfering with the use of private property. Only when local norms and values about a healthy environment are consistently articulated are regulations passed by state legislatures and implemented by governors… very often those who control political capital do not hold elected positions but are regularly consulted by elected officials" (Flora and Flora 2008:145).

Human capital includes the characteristics and potential of individuals within the community, including formal education, skills, health, leadership, talents, and self-esteem (Flora and Flora 2008). Central aspects of this dimension consider attributes of individuals contributing to their ability to earn a living, strengthen community, and otherwise contribute to community organizations, their families, and self-improvement. Some of the most important forms of human capital are believed to be both formal education and learning skills and gaining knowledge through experience (Flora and Flora 2008). Researchers argue that human capital is often influenced by the opportunity structure of a community, such as the types of industries and businesses that are located or can be initiated in the area (Flora and Flora 2008). "Employment opportunities in rural areas determine both the kind of education available and the degree to which students are motivated to take advantage of them" (Flora and Flora 2008:110). Often the opportunity structure of many rural communities has become a vicious cycle that affects the community's success in attracting or supporting new business enterprises, as many of the young

people either become educated and do not return or those who remain in the community tend to continue to support existing industries and businesses (Flora and Flora 2008).

Built capital generally encompasses the physical infrastructure of a given community, providing a supporting foundation that facilitates human activity and enables network communication and access to services and markets. It includes roads, streets, bridges, airports, railroads, electric and natural gas utility systems, communication infrastructure, water supply systems, police and fire-protection facilities, wastewater treatment and waste-disposal facilities, schools, hospitals, and other public and commercial buildings (Flora and Flora 2008). "Cultural capital has a great deal to do with the meaning of property to different groups, and thus different cultures classify built capital in diverse ways" (Flora and Flora 2008: 216).

Financial capital denotes resources that are translated into monetary instruments that make them highly liquid, or easily converted into other assets (Flora and Flora 2008). Built capital is a tangible form of financial capital, and land often becomes an investment because of the resources it has or the development of space it offers (Flora and Flora 2008). Financial capital can be divided into public and private capital, often linked through partnerships such as when private companies are granted permission to mine resources from public lands. One distinct characteristic of both financial and human capital compared to other forms of capital is its high degree of mobility. Money and people can move to wherever they can earn the highest returns or salaries, while natural capital and built capital are not mobile (Flora and Flora 2008).

The community capitals framework was originally constructed for rural community development initiatives as a means to inventory capital/assets in a community and to make problem areas easier to identify. Increasingly, community capitals are being applied to other research agendas such as disaster research. Stofferahn (2012) and Goreham (2013) both employed the community capitals framework to analyze tornado recovery in rural communities in

an effort to broaden the focus of recovery beyond social capital to gain a holistic understanding of the recovery process. Other disaster researchers have found value in this framework as well. Ritchie and Gill encourage its application for disaster mitigation and recovery efforts, stating, "Understanding the extent to which various forms of capital exist in a community is central to effective emergency management and can help to inform efforts to increase resilience" (2011:2).

This study aims to apply the community capitals framework as a way to compare and contrast other communities experiencing increased oil and gas activity more systematically. Like Ritchie and Gill, I believe that gaining a more nuanced understanding of how residents are discussing issues related to enhanced oil and gas technology will provide valuable insight to officials and disaster response agencies of the unique challenges they may face from one community to the next. Given the prevalence of hydraulic fracturing as an increasingly common technological hazard to communities throughout the United States, the community capitals framework seems appropriate for gaining a better understanding of community processes for both increasing community resilience and gaining a deeper understanding of community outcomes.

The community capitals framework allows us to view a community as a system, making it possible to examine the nuances of a community in a variety of contexts. The adoption of this framework would likely make cross comparisons of communities more efficient as the same seven dimensions would be considered in each case study. Emery and Flora state "such an approach will be useful when we look at two similar communities facing very different futures" (2006:33). The community capitals framework highlights interdependence, interaction, and synergy among the capitals, as use of assets in one capital can have a "domino effect" on the other capitals in both positive and negative ways (Gutierrez-Montes, Emery, and Fernandez-Baca 2009). The importance of particular capitals may vary between communities as well as cases in which it is applied.

Hydraulic Fracturing as a Technological Hazard

A hazard is defined in disaster research as a threat to people and what they value, while risk is a term used to refer to the probability that some "triggering" event will occur that will transform a hazard into an emergency (Cutter Boruff and Shirley 2003; Gregg and Houghton 2006; Kroll-Smith and Couch 1993; Short 1984; Tierney 2014). Risk interacts with mitigation to produce the hazard potential, which is either moderated or enhanced by the social fabric of a place. Social fabric includes community experience with hazards, as well as the community's ability to respond to, cope with, recover from, and adapt to hazards (Cutter Boruff and Shirley 2003). In other words the degree to which communities are able to anticipate and prepare for a potential hazard will determine the overall level of risk they may face if a technological hazard is triggered.

Technological disasters (e.g. Three Mile Island, Love Canal, Chernobyl, etc.) differ from natural disasters (e.g. hurricanes, tornados, forest fires, etc.) as they are characterized by contamination of the biosphere (Radiation, toxic chemical spills etc.). Short (1984) claims that technological disasters place the social fabric itself at risk. According to Gill and Picou "a technological disaster occurs when breakdowns in technological and bureaucratic organization systems lead to destruction or contamination of the natural and built environment" (1998:796). Technological disasters are believed to be the result of an individual or organization's failure to carry out their tasks, and often lead to prolonged litigation between those believed to be at fault and those who claim to be affected (Erikson 1994; Freudenberg and Jones 1991; Gill and Picou 1998; Kroll-Smith and Couch 1993; Short 1984; Tierney 2012). The presence of a technological hazard means that there is a certain probability that an emergency will occur. As systems become more elaborate and complex we know that accidents are bound to happen, at some point "hands will slip and machinery will fail" (Erikson 1994:143).

The idea that as technology and society become more complex, disastrous outcomes resulting from the breakdown in normal operations become inevitable is best encompassed by Charles Perrow's concept of normal accidents. Normal accidents, or system accidents, occur in man-made systems so complex that no matter how hard we might try, certain kinds of systems are bound to fail eventually (Perrow 1984, 2004, 2011). Perrow asserts that technological accidents such as Three Mile Island and Chernobyl, but also those related to resource extraction, are examples of risks that we run when we allow high concentrations of energy, economic power, and political power to form (2011:44). Normal accident theory says that even if we had excellent regulation and everyone played it safe, there would still be accidents in systems that are highly complex (Perrow 2011:50). Furthermore, according to Perrow, the larger the organizations the greater the concentration of destructive power. Larger organizations have greater political power that can influence regulations and warnings (Perrow 1984, 2004, 2011). Thus, industries that have high concentrations of financial and political capital may inadvertently increase their potential for normal accidents to occur, since they also have the power to resist a certain degree of oversight and regulation.

The processes prior to, during, and after hydraulic fracturing are rife with risk, especially when in close proximity to communities. Hundreds of chemicals are used over the course of the hydraulic fracturing process in order to maximize well productivity and ease the flow of oil and natural gas into the wellbore. The combination of chemicals used may vary widely between companies and based upon the specific geological properties of the shale formation from which extraction occurs (Chen et al 2012; Colborn et al 2011). Even though proprietary chemicals typically make up less than one percent of hydraulic fracturing fluid, which is mostly comprised of water and a proppant (typically silica), it can amount to thousands of gallons of chemicals per well (Chen et al. 2014; Clark et al. 2012; Schultz et al. 2011). Although the hydraulic fracturing step itself may be debated as generally safe, research has stated that every stage of oil and natural

gas extraction from well construction to distribution can potentially lead to air and water contamination (Clark et al 2012; Colborn et al 2011; Webb et al. 2014).

The potential for subsurface migration of wastewater and toxic fracturing fluids to aquifers and groundwater sources as the result of the hydraulic fracturing phase is often discussed as unlikely given the depths at which the process takes place. However, many studies have found that the most common threats to groundwater contamination arise from faulty well construction, leaks in wastewater retention ponds, and surface spills (Clark et al 2012; Chen et al 2014; Colborn et al 2011; Davis 2012; Gordalla Ewers and Frimmel 2013; Gross et al 2013; Hagström and Adams 2012; Hudgins and Poole 2014; Perry 2012; Webb et al 2014). It is commonly reported that water usage and fears of contamination are amongst the greatest concerns of residents located near oil and gas operations (Heuer & Chih Lee 2014; Kriesky Goldstein and Beach 2013; Ladd 2013, 2014; Stedman et al 2012; Theodori 2009; Theodori 2013).

Vast amounts of water and chemicals must be transported to the wells via truck, which has been estimated to require approximately 1,500 to 2,000 truck trips over the life of the well. Tens of thousands of wells may exist in a given county with multiple wells per well pad, dramatically increasing the presence of mobile hazards for nearby communities (Chen et al 2014; Clark 2012; Davis 2012; Shultz et al 2011; Zucker 2014). Boomtown literature typically reports an increase in traffic accidents as the result of population growth and increased heavy truck traffic as one of the many common negative outcomes associated with rapid industrial growth in rural areas (Jacquet 2014; Ruddell 2011; Ruddell Ortiz and Natalie 2015; Theodori 2009). An influx in traffic only serves to elevate the risk to communities from nearby oil and gas production due to increased likelihood that an accident with a HAZMAT tanker may occur.

Flowback or produced water, is the wastewater that comes out of the well from the hydraulic fracturing process, and is continuously produced over the lifetime of a well. Produced

water contains brine, fracturing fluid additives, hydrocarbons, and suspended and dissolved constituents from the shale formation, and sometimes naturally occurring radioactive materials (NORM) which can be a health concern when present in significant concentrations (Clark 2012; Chen et al 2014). Of particular interest is the release of benzene, toluene, ethyl benzene, and xylene (BTEX), believed to be found in flowback water and associated with adverse human health effects (Gross et al. 2013; McKenzie et al. 2014; Schultz et al. 2011; Webb et al. 2014). From the human-toxicological point of view, flowback water is more problematic than initial fracking fluids, as flowback often contains heavy metals (Gordalla Ewers and Frimmel 2013). Flowback water is generally stockpiled on site, in tanks or open pits. The evaporation of chemicals from open pits commonly contributes to air pollution and groundwater contamination (Chen et al 2013; Gross et al. 2013; McKenzie et al. 2014; Schultz 2011; Webb et al. 2014). Spills from pits have been widely reported, largely due to improper lining, or from storm damage or overflow due to heavy rains. Between 2009 and 2010, of the 4,000 permitted oil and natural gas wells in the Marcellus Shale in Pennsylvania, there were 630 reported environmental health and safety violations, of which half were associated with leaks and spills of flowback water (Chen et al 2013; Osborn et al 2011).

The most common disposal technique for produced water in Oklahoma is deep-well injection due to the massive amounts of water needed to stimulate the wells in this region and the high water levels existing in the limestone play. Wastewater is disposed of in either a new well specially drilled for wastewater disposal, or into old wells that have been deemed appropriate for disposal. The well must meet specific requirements on depth and it has to be determined that the horizons being disposed into are naturally sealed by the geologic formation to prevent the migration into freshwater horizons (e.g. to prevent groundwater contamination). This technique has become controversial throughout Oklahoma, Arkansas, Kansas, and a part of Texas as the vast amounts of water being disposed of is believed to have contributed to an increase in seismic

activity, as some scientist argue that some injection wells are feeding water into fault lines, thus triggering earthquakes. Geologists refer to this as induced seismicity since it is believed that the vast majority of earthquakes across the region are being triggered by a manmade technology (Holland 2013; Keranen et al. 2013).

Faulty well construction poses another major threat to local groundwater as it is commonly cited as one of the most likely places in which groundwater contamination could occur besides surface spills. One of the largest documented instances of water contamination, occurring in Bradford, Pennsylvania resulted not from hydraulic fracturing, but from a well blowout (Clark 2012; Rabinowitz et al. 2015). A similar scenario occurred in Wyoming when the Crosby well blowout erupted drilling fluids for 58 hours contaminating 25,000 square feet of soil surface (Colborn et al 2011). Both events occurred after drilling, but prior to the hydraulic fracturing phase. Numerous cases of alleged groundwater contamination have been reported near oil and gas operations around the country over the past several years, usually going unresolved in court due to lack of definitive evidence. Some studies have reported statistical associations between negative birth outcomes and residential proximity of the mother to well pads during pregnancy, resulting in low birth weights, congenital heart defects, neural tube defects, preterm birth, and even stillbirths (McKenzie et al. 2014; Webb et al. 2014; Zucker 2014).

Regardless of the actual presence of contamination, the fear of contamination is certainly present in many communities which is enough to set in motion a process of claims and counter-claims making, litigation, and stigma within communities, all of which are symptoms of technological hazards (Cuthbertons and Nigg 1987; Erikson 1994; Freudenberg 1993; Freudenberg and Gramling 1994; Gill 1994; Gill and Picou 1998; Kroll-Smith and Couch 1993; Tierney 2014; Short 1984). Understanding the extent of the risk involved is essential in order to make appropriate mitigation efforts toward reducing the risk of being a future host location to a technological disaster. Homeland Security Presidential Directive 8 under the Bush administration

emphasized the need for collaboration among governmental, private sector, and civil society institutions and organizations in achieving social resilience against disaster, and FEMA emphasizes the "whole community" approach to disaster risk reduction (Tierney 2014). The trend in emergency management in the 21st Century has become mitigation at the local level, meaning it is the responsibility of local municipalities to involve the community in identifying and preparing for all known hazards within a given location. However, oil and gas exploration utilizing hydraulic fracturing represents a unique challenge to an increasing number of communities across the country, as the typical precautions for technological hazards do not apply to oil and gas exploration. As a result, widely different outcomes have occurred for communities based on location, as culture, politics, history, and social norms converge to determine community resilience in the face of such a unique hazard. Because enhanced community resources are known to be fundamental to resilience, the community capitals framework can be a useful tool for gaining a deeper understanding of community variation when confronted with the controversial practice of hydraulic fracturing.

Hydraulic Fracturing and Community Capitals

Although various dimensions of community capitals are interrelated and essential for understanding sustainability, this study will focus on a few key relationships between capitals as they may apply to communities near oil and gas operations. Understanding combinations of existing capitals may help explain how people are responding to the advent of oil and gas activity and hydraulic fracturing within a particular community. First political and financial capital, or political economy, may be one of the most important relationships between capitals for any community reliant on oil and gas extraction and production. Second, cultural and natural capital share an important relationship as the overarching worldview of a community as it relates to

natural assets will likely help to inform the degree of resistance local governments and the industry may face from community residents. Finally, social capital is important in determining how successful a community may be in leveraging political capital in its favor in terms of negotiating coexistence with the industry. Thus, I offer more depth of discussion of how the dimensions of community capitals may be best used to address technological risks related to hydraulic fracturing.

Financial and Political Capital

According to Flora and Flora (2008), political struggles generally play out in a three-way negotiation process between the market, the state, and civil society. Markets are the many firms and institutions that exchange goods and services for profit, while the state is responsible for creating stable market conditions as well as providing for public welfare of civil society through the enforcement of laws and regulations. Civil society is made up of formal and informal groups that join together around common interests or values. Through organized activity, civil society can influence both the market and the state by engaging in boycotts, creating information campaigns, bringing law suits, and urging particular laws to be enforced (Flora and Flora 2008). Political capital consists of organizations, connections, voice, and power as citizens to turn shared norms and values into standards that are codified into rules and regulations. In general, political capital reflects the dominant cultural capital of a given location, and very often those who control political capital do not hold elected positions, which may result in a hidden power structure (Flora and Flora 2008). Those with the most power and influence often have the most financial capital, therefore the relationship between political and financial capital—or political economy—in a given location may be critical to understanding the resilience of a community in terms of technological hazards.

In an effort to reduce foreign dependence on fossil fuel imports, the U.S. government has made an effort to increase domestic oil and gas exploration through various legislative efforts. Numerous policies have granted exclusions and exemptions for oil and gas exploration and production in the form of federal environmental statutes over the past couple of decades (Schultz et al 2011). Earlier efforts include exclusion from the Clean Water Act, the Superfund Act[1] (CERCLA), the Resource Conservation and Recovery Act (RCRA[2]), the Toxic Release Inventory under the Emergency Planning and Community Right-to-Know Act (EPCRA), and the National Environmental Policy ACT (NEPA) (Chen et al 2014; Hagström and Adams 2012; Schultz et al 2011). The most recent effort was the 2005 Energy Policy Act, which prevented the use of the Safe Drinking Water Act to regulate the underground injection of hydraulic fracturing wastewater, as well as amending the Clean Water Act to exclude from the definition of "pollution" any material which is injected into a well to facilitate production of oil and gas (Clark et al 2012; Chen et al 2014; Davis 2012; Hagström and Adams 2012; Schultz et al 2011). Such legislative efforts have essentially stripped regulatory authority away from the EPA and left regulatory responsibility up to the states.

Individual states have encouraged or required disclosure of chemicals used in hydraulic fracturing fluids, however trade secret protection often allows companies to conceal much of the

[1] The Comprehensive Environmental Response, Compensation, and Liability ACT (CERCLA) also known as Superfund, created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. The definition of "hazardous substance" does not include petroleum, natural gas,

[2] Provisions of the Resource Conservation and Recovery Act (RCRA) exempt drilling fluids, produced waters, and other wastes associated with the exploration, development, or production of crude oil, natural gas, or geothermal energy from regulation as hazardous wastes under Subtitle C of RCRA. However, these wastes are subject to other federal laws (such as the SDWA and the CWA), as well as to state requirements. Facility owners and operators and other potentially responsible parties could potentially face liability under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for cleanup costs, natural resource damages, and the costs of federal public health studies, if hydraulic fracturing results in the release of hazardous substances at or under the surface in a manner that may endanger public health or the environment. (Congressional Research Service 2014, Hydraulic Fracturing:. CRS Report.)

information regarding chemical usage. Of the 29 states with hydraulic fracturing activity, 15 have enacted disclosure laws. Of this 15, nine are exempted from disclosing chemicals that serve as trade secrets (Chen et al. 2014). Wyoming became the first state to require disclosure in 2010, but the state allowed for an exemption of confidential commercial information—trade secrets—resulting in the protection of 150 chemicals from disclosure (Clark et al. 2012). Several states require disclosure through FracFocus.org while others encourage it, although specifications for what is considered disclosure differ by state (Clark et al. 2012; Heikkila et al. 2014).

State protections for oil and gas companies, which place limits on civil society's ability to make proper concessions for public safety, are directly influenced by the amount of money at stake for oil and gas operators. It is estimated that unconventional natural gas development in the United States in 2015 will be responsible for approximately 1.5 million jobs, $50 billion in federal, state, and local taxes, and an overall contribution to the US economy of $200 billion (Zoback and Arent 2014). Economic benefits are not, however, equally beneficial to all states and their localities, thus the impetus for states to regulate the industry within their borders may vary depending on perceived economic importance. Therefore the potential risk may be determined by the political economy of the state in which a community is situated.

Ali (2002) states that the types of disasters and where they occur are linked to risks that are built up over time as a byproduct of political and economic forces. Tierney (2014) claims macro-level explanations tell only part of the story and shed little light on the complex causal paths that influence risk. A more sound approach begins with the assumption that large-scale conditions exert their influence at smaller-scale levels of analysis, such as regions and communities; that is local conditions matter. Subnational levels are the levels at which policies can be rendered effective, or watered down and ignored (Tierney 2014). Freudenberg and Gramling (1994) state, "efforts to extract oil using technologies that increasingly push the envelope of safety expose communities and their residents to a growing potential for

environmental harm," asserting that vulnerabilities are best understood when local level processes are considered (Tierney 2012: 65). Therefore, gaining a deeper understanding of local processes, and the varying degree of pressure faced from outside entities, can shed light on the degree of risk each community faces. Furthermore, the link between financial and political capital of a community and its history will likely be reflected in the cultural capital of that community.

Natural & Cultural Capital

Natural and cultural capital may interact in interesting ways in communities experiencing resource extraction. Cultural capital is essentially the existence of various worldviews and practices within a community. Flora and Flora (2008) describe cultural capital as the legacy parents pass on to their children that in turn influences the choices they make. There may be many cultural capitals coexisting in most communities, and each of them determines the right way to know, act, and understand, which correspondingly influences what a person believes can be changed (Flora and Flora 2008). Those with power are able to define key issues according to their own values, which tend to prevail as the overarching worldview in a community. Flora and Flora (2008) claim that differing values given to land have led to struggles over access and control. In the context of oil and gas extraction, it is the natural mineral reserves trapped deep beneath the surface of the land that is valued by oil and gas companies and mineral rights owners as a resource to be turned into financial capital. Thus, cultural capital is closely linked to how natural assets are viewed, potentially making this relationship one of the most important to understand as it may determine the long-term trajectory of a community. Most importantly, cultural capital within a given region may vary widely, resulting in a variety of views towards the value of natural resources that may range from support for transforming natural capital into financial opportunities through extraction or development purposes, to valuing preservation of the biosphere and maintaining clean air and water over all else (Flora and Flora 2008)

Social fault lines exist in every community and relate to differing worldviews, generally kept together by consensus emphasizing the common good (Gill 1994). Numerous studies suggest that the general public attitude towards hydraulic fracturing in active shale plays are a mixture of positive and negative perceptions relating to both financial gain and environmental concern (Ladd 2013, 2014; Schafft, Borlu and Glenna 2013; Theodori 2009; Theodori 2013). Most studies do not inquire about an overall cost benefit perspective, but Ladd (2013) found that stakeholders in the Haynesville Shale region of Louisiana generally believed that the economic benefits do in fact outweigh the many cited potential negative impacts. Stedman and colleagues (2012) found that New York residents were less likely to agree that enough is known about the effects to acknowledge that the benefits outweigh the costs of natural gas extraction, in comparison to Pennsylvania residents. Such trends suggest that cultural capital in both Pennsylvania and Louisiana are likely diverse, and that social fault lines stemming from one's view of natural capital may be held together through the consensus that economic benefits to the community override individual concern towards its disruption.

Ladd (2013) suggests that communities with a history of extraction are likely to view oil and gas activity more favorably than communities that lack that history. Tierney (2014) states that the effects of disasters are not so much determined by nature and technology as by societal characteristics and broad historical processes that shape the "hazardness of place" which exposes groups to various risks. Kroll-Smith and Couch assert:

> Most studies of risk rely on the concept of "perception" to convey the link between the hazard and the person's appraisal of danger. Beliefs more profoundly influence the believer than perceptions influence the perceiver. To perceive is to become aware of something directly through the senses; to believe is to commit with conviction to a publically ratified view of some aspect of the world. Beliefs are internalized; they are located deeper in the psyche than perceptions and are far less easily modified (1993: 84).

Believers, according to Kroll-Smith and Couch (1993) are certain of the "true" extent of the danger, and require much less information to support their worldviews, and an extraordinary amount of information to disconfirm them. Freudenberg (1993) echoes this idea claiming differences in risk perception are more strongly related to personal values rather than differential information levels. Such ideas suggests that a difference in cultural capital maintains, which likely explains the diverging paths taken by New York and Pennsylvania despite being adjacent to one another. Stedman and colleagues (2012) assert that New York residents were more opposed to development, and characterized the industry in a more negative light than Pennsylvania residents while reporting no differences on levels of perceived knowledge of hydraulic fracturing. Thus, Pennsylvania's history of natural resource extraction and considerably higher levels of oil and gas activity indicates a general belief system toward natural resources that differs from that of New York residents. Furthermore, stakeholders perceiving the same oil and gas phenomena within the same community will likely arrive at different conclusions based upon the cultural capitals that exist within the community. When controversy stemming from a technological hazard escalates, the various social fault lines rooted in cultural capital may become seismic, resulting in dire consequences for a community's social capital.

Social Capital

Social capital is the degree to which ties among and between various groups exist within and extend beyond a community. Much like the other capitals, the way in which social capital is constructed depends on the history and character of the individual community (Flora and Flora 2008). Social capital in communities occurs at the group level, and can become a powerful tool for civil society when relationships and communication between and among groups is strong. Two subtypes of social capital can be useful for observing community ties; bonding social capital, and bridging social capital. Bonding social capital consists of connections among individuals and groups with similar backgrounds in which ties are generally emotionally charged.

Bridging social capital connects groups within communities and beyond it, and is usually based on an instrumental purpose (Flora and Flora 2008). When bridging and bonding social capital are both high, community action is usually effective. When both are low, extreme individualism dominates and community residents typically relate apathetically to their community. The degree to which social capital exists within a community largely determines a community's ability to build networks and organize (Coleman 1988; Flora and Flora 2008; Putnam 2000).

Technological disasters are known to erode social ties within a community. The process of claims making begins with some party asserting that the existence of a hazard has had an adverse effect on their personal or family's health and seek justice for the perceived wrongdoing. Counterclaims are then made by the accused entity and its supporters, usually accusing the claims maker of hyperbole or wrongful accusations, which often leads to a process of ongoing litigation (Kroll-Smith and Couch 1993). Fear, hysteria, and greed are among the several labels antagonists apply to each other to explain away opposing claims, and it is the negative labeling that heightens the emotional intensity of the conflict, exacting a toll on the psychosocial stability of disputants (Kroll-Smith and Couch 1993).

Gill (1994) claims that a technological disaster can weaken the social fabric along various social fault lines that exist within a community, causing deep schisms to form as community ties begin to break. Because contamination is often invisible to the naked eye, claims of exposure create an atmosphere of extreme uncertainty that can lead to a breakdown of social ties (Vyner 1988). Initial claims makers typically emerge as individuals who believe they have been negatively impacted by such contamination, which is commonly met with counter claims that dismiss or scrutinize these individuals. As belief in contamination intensifies, believers begin to withdraw from their normal support networks and form groups of their own, together reaffirming one another's fears, "developing a set of cognitive and emotive assumptions about danger that place them farther outside the boundaries of ordinary community life" (Kroll-Smith and Couch

1991:64). According to Freudenberg and Jones (1991) "corrosive communities" are characterized by the assignment of blame to parties seen as responsible, as well as by intergroup conflict, suspicion of claims being made by authorities and experts, and litigation and the threat of litigation. Those who feel wronged often feel a sense of considerable estrangement particularly as they learn that community organizers are unable to provide effective protection from danger (Freudenberg 1993). Technological disasters contribute to chronic-social-psychological disruption known as sociotoxic syndrome, which affects the behavior and attitudes of those impacted (Gill and Picou 1998). Lifestyles are disrupted, families are impacted, and victims generally feel a loss of control over their sense of personal well-being, which leads to patterns of stress and depression (Gill and Picou 1998). Ultimately the sense of community as a whole is altered and sometimes eliminated altogether. Gill and Picou assert "the concept of corrosive community suggests a deterioration of social relationships, resulting from fear, anger, apprehension, confusion, and stress that characterize a social milieu of uncertainty" (1998:797).

Based upon the unseen nature of contamination cases it is possible that social upheaval may be fostered in communities prior to any known incident of contamination simply because the mere belief that one is, or may be impacted. Beliefs of contamination, or the possibility of contamination, may create an air of uncertainty that could set in motion a process of internal dispute leading to a corrosive community. Thus, it is likely that there may be evidence of technological disaster related social symptoms in communities where technological hazards are present well before a disaster or emergency situation occurs. Kroll-Smith and Couch maintain that "contaminating the environment is more than an ecological emergency, it is also a social and political crisis" (1993:79). Therefore, the manner in which community leaders respond or fail to respond to the known risks involved with hydraulic fracturing could have serious long-term impacts on their communities.

Analytical Framework

The community capitals framework may prove to be important for shedding light on the nuances existing in impacted communities, perhaps leading to improved chances of broader public support, policy changes, and strengthened community resilience (Ritchie and Gill 2007, 2011). The community capitals framework offers a lens through which communities may be examined to determine the level of risk and vulnerability they may face in the presence of technological hazards. The ability of a community to effectively implement mitigation efforts to increase overall resiliency is directly affected by relationships to the market, the state, and community members themselves. Communities located in states where extractive industries are perceived to have a significant economic role, may find their municipal autonomy to ensure public safety diminished through state level legislative efforts favoring the rights of oil and gas operators and mineral rights owners. However, communities with a historical narrative tied to extractive industries are also likely to be dominated by a cultural ideology more favorable to extraction practices than communities that have a different relationship to their natural resources (Clark et al 2012; Davis 2012; Ladd 2013, 2014; Stedman et al 2012; Theodori 2009, 2013).

This project examines hydraulic fracturing and associated processes as technological hazards, while applying the community capitals framework to a community experiencing intense oil and gas activity over the past several years. Many studies have inquired about stakeholder perceptions (Anderson and Theodori 2009; Ladd 2013, 2014; Schafft Borlu and Glenna 2013; Stedman et al 2012; Theodori 2009, 2013;Wynveen 2011), but I take a more nuanced approach to understanding community attitudes and behaviors in the face of what may be seen by stakeholders as a looming technological hazard. Insight into stakeholder assessments may prove invaluable to community leaders, health care practitioners, emergency management, and concerned citizens with respect to mitigation and response efforts, as the choices communities make or fail to make in the face of a hazard is what often determines the level of risk if at any

point the hazard becomes an emergency situation (Tierney 2014). Using the case study approach, this study may serve as a point of comparison for other communities experiencing pervasive oil and gas extraction. The community capitals framework is ideal for highlighting particular relationships between capitals that result in unique outcomes. Finally, discussing oil and gas extraction and associated processes as technological hazards raises questions as to how community response and mitigation efforts may be hindered by the exempt nature of oil and gas exploration from the very programs and oversight designed to address other technological hazards.

CHAPTER III

RESEARCH DESIGN

This study makes use of the case study method to understand stakeholder perceptions of extraction processes such as hydraulic fracturing in a community impacted by a recent surge in oil and gas extraction activity. According to Hesse-Biber and Leavy (2006) a case study provides the researcher with a holistic understanding of a problem, issue, or phenomena within a social context. The method concentrates on experiential knowledge of a case and [pays] close attention to the influence of social, political, and other contexts (Stake 2005). Yin (2003) asserts that case studies are used when the researcher deliberately wants to cover contextual conditions, believing that they might be highly pertinent to the phenomenon of study. Ultimately, "the aim of case study is to understand, in a meaningful and nuanced way, the view of those within the case" (Stake 2005: 263).

The unit of analysis for this case study is the community of Stillwater, Oklahoma, a town located in central Oklahoma examined through twenty-seven stakeholder interviews with 33 respondents (n=33) and triangulated with participant observation of city council meetings and 146 local newspaper articles and editorials. This case study is both problem and descriptive based, as the objective of this study is to examine the ways in which intense oil and gas activity affects the community, and to describe the current state of the community through stakeholder narratives and archival materials. I specifically explore how stakeholders construct risk associated

with oil and gas production, how the historical significance of oil and gas in the region may affect their responses, and how the community capitals framework may be applied to this case study.

Stakeholders were selected through a purposive sample and are defined as any person with a stake in the focus community including both residents and non-residents so long as they report having a vested interest in the community. Stakeholders in this study range from 23 to 80 years of age, with the median age being 49.The sample is half (50%) male and half (50%) female and is mostly (85%) white, with two stakeholders identifying as Hispanic and one as Native American. Education ranges from some college to Ph.D., with most stakeholders (94%) holding a bachelor degree or higher, and nearly half (41%) having a background in science. Most stakeholders (84%) report being married and earning between $60,000 and $100,000 annually (87%). My sample is representative of the community when compared to Stillwater census data, as roughly half (49.4%) of Stillwater is female, mostly white (79.5%) and holds a bachelor degree or higher (48.5%) (U.S Bureau of the Census 2010). However, the median age is 26 years old and the median income is approximately $38,000, likely due to the nature of Stillwater as a college town (U.S Bureau of the Census 2010). Stakeholders participating in this study are primarily year-round Stillwater residents and thus older and more established in their careers. The community boundary is defined as within the city limits or within one mile of city limits. Individuals with vested interests include city residents, oil and gas workers/representatives, mineral rights owners, county residents that live within one mile of city limits, and local politicians. My work is part of a larger project addressing community dynamics associated with resource extraction. My interviews are intended to reflect a broad cross-section of residents to gain access to the diverse and nuanced experiences across the Stillwater community, rather than a specific stakeholder group. Key informants were utilized to gain the initial entrée into the community and all participants were contacted for recruitment purposes via email and telephone. Snowball sampling was employed to access several difficult to reach stakeholders (Hess-Biber

and Leavy 2006: 47). All interviews took place during a lull in oil and gas drilling activity, and in the immediate months following the passing of a controversial city zoning ordinance and state legislation limiting municipal control of oil and gas activity.

Semi-structured interviews were deemed to be the appropriate approach for this case study as the technique allows individual respondents some latitude and freedom to talk about what is of interest to them. Interviewees often have information or knowledge unavailable to the researcher (Hess-Biber and Leavy 2006). All but one interview took place in person in an agreed upon location. One interview was conducted via telephone. Interviews lasted between thirty minutes and three hours, most lasting closer to one hour each. Interviews were audio recorded and transcribed. Conversations were confidential and all identifying information was removed from the transcripts. Transcripts were coded line-by-line and analyzed with the use of a community capitals framework.

An interpretive approach was employed to gain a deeper understanding of how stakeholders construct meaning regarding nearby oil and gas development (Creswell 2007; Denzin and Lincoln 2005; Hess-Biber and Leavy 2006). Specifically, participatory approaches draw on the phenomenological perspective, focusing on the process whereby individuals understand and give a sense of order to the world in which they live, with particular interest in how meaning is negotiated in a social context through a process of interaction with others (Creswell 2007; Hess-Biber and Leavy 2006). Line by line interpretive coding strategies was used for data analysis. Themes used to uncover perspectives included HEALTH (whether or not stakeholders believed there were any health risk), RISK (types of risks that were constructed), SOCIAL (the presence of social tension or local conflict), and CULT (personal and cultural beliefs related to oil and gas production) among others.

Local newspaper articles and editorials were also analyzed for content. The *Stillwater News Press* was selected due to its focus and reporting of events occurring within the Stillwater community. Keywords including: hydraulic fracturing, fracking, earthquake, and induced seismicity were used to identify 90 pertinent articles and editorials. Archival materials were collected beginning January, 2008 (marking the increase in conversations about oil and gas activity and seismicity) and ending in October, 2015 (several months after the City's passage of oil and gas zoning regulations). Semi-structured interviews were contextualized with newspaper articles, editorials, and participatory observation. Data was managed and analyzed using Microsoft word, Excel, and the computer software package NVIVO 9.

The findings from this case may not be generalizable to all other communities experiencing an oil and gas boom, but may be transferrable to other communities sharing similar characteristics and context. As Lincoln and Guba state, "the degree of transferability is a direct function of the similarity between two contexts, what we shall call *fittingness*" (2000: 124). Therefore generalizations can only be made to this particular case, as the stakeholder narratives will largely drive the descriptions of the community. Validity may be strengthened through the triangulation of narratives with observation, archival materials and field notes. Even though the results cannot be generalized to all oil and gas communities, the explanatory power of the community capitals framework may allow for more interesting cross comparisons with other cases in the future.

One of the major limitations of this study is that the stakeholder population is not representative of most small communities in Oklahoma. Therefore this case may only be transferrable to similarly sized communities, with like educational demographics such as Denton, Texas, or College Station, Texas. Although it is possible that similar dynamics may be found in other rural Oklahoma communities, the existence of multiple cultural capital groups may not be as prevalent as in the case for the community under study. Despite this study representing the

narratives of stakeholders with higher than average levels of education and income, tensions surrounding private property and compensation issues may be similar in other communities. Another limitation of this study involves the generic usage of the terminology "fracking" to refer to the entire oil and gas extraction process, rather than the single phase of well stimulation that the industry term "hydraulic fracturing" actually denotes. Even though it is not addressed in this study, numerous examples of differing definitions causing confusion in both the interview process and for stakeholders interacting among themselves exist. More attention to terminology, language use, and meaning may prove important in regions where oil and gas is prevalent and residents feel relatively informed about the process. I now turn to my analysis.

CHAPTER IV

COMMUNITY CONTEXT AND CONSTRUCTING COMMUNITY CAPITALS

Before I identify and construct the various emerging categories of community capitals as seen in the case study community, I must address the overall community context in which the interviews take place. I begin by briefly describing the political and social climate of the community over the span of several years preceding the interview process in order to situate the interview data within its proper social, political, and historical context.

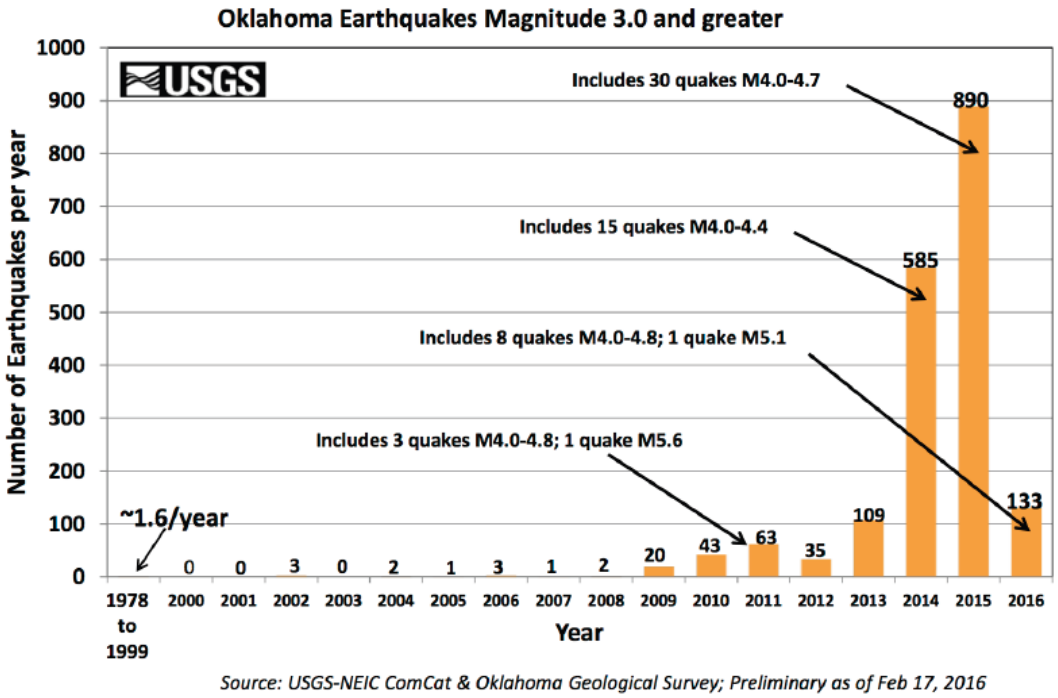
Community Context

Stillwater, Oklahoma is a small college community with a population of roughly 45,000 residents. Relatively few area employers are established in the town, although the local economy may be considerably more diverse than the majority of rural Oklahoma communities (U.S Bureau of the Census 2010). Over the past several years the community has witnessed a significant uptick in oil and gas activity, with development occurring in the surrounding county and abutting city limits and several major producers establishing regional offices within the city limits.

Between 2008 and 2015 north central Oklahoma experienced an unprecedented increase in seismic activity. Figure 2 shows that earthquakes spiked from two[3] in 2008 to eight hundred ninety in 2015. In 2011 a 5.6 magnitude earthquake grabbed the attention of residents from across the region, registering as the largest recorded earthquake in Oklahoma history to date. This event is commonly referred to by Stillwater stakeholders as the first earthquake they remember experiencing, eventually raising questions about the relationship between oil and gas activity and the increasing seismic activity, a topic that would be hotly debated over the next several years. The *Stillwater News Press* began to cover earthquake debates in January of 2014, which would prove to be a year in which the most dramatic and intense spike in seismic activity occurred since the trend began. Over the course of the next year concerns over the potential for having a disastrous earthquake grew in the community, sparking the development of a local Science Café series held at the Stillwater Public library. This series addressed public concern by featuring professors and other experts from around the state, with the goal of educating the public on the more technical aspects of oil and gas production, including the possibility of induced seismicity. This series was well attended by the public, sometimes attracting more than 100 audience members. According to the local newspaper, the state of Oklahoma did not acknowledge any link between wastewater injection and the spike in seismic activity until September of 2015 (Day 2015).

[3] Earthquakes recorded by United States Geological Survey (USGS) are defined as all earthquakes that register a 3.0 magnitude or higher.

Figure 2.



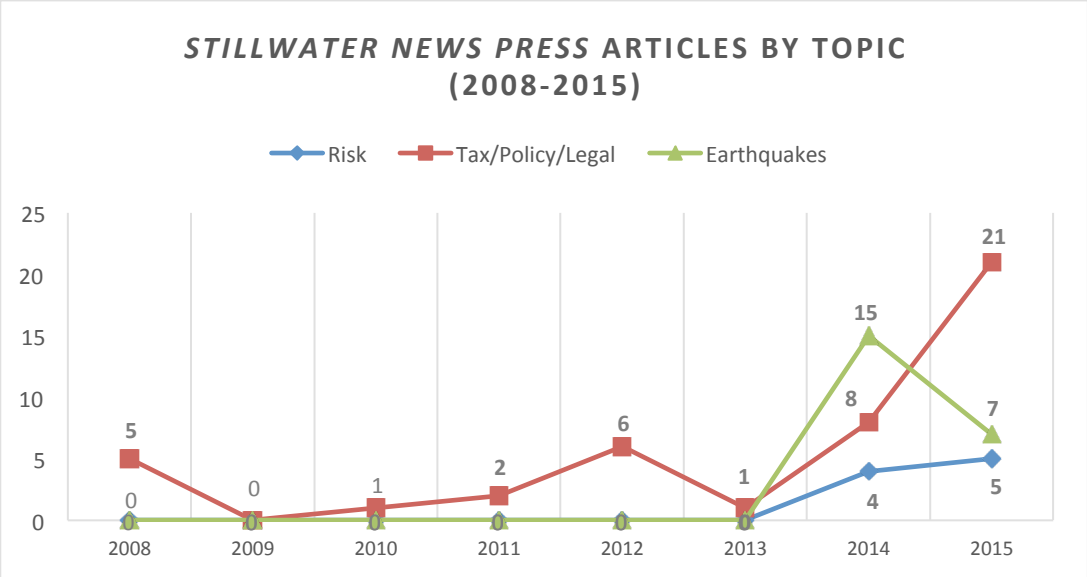
Meanwhile, in January of 2015, several concerned citizens in a neighborhood located on the edge of Stillwater city limits alerted the city council of a well that was being developed a few hundred feet behind their subdivision on county land. Stakeholders soon began coming out from across the community to express a variety of complaints that ranged from health related concerns, to nuisance issues from the drilling equipment operating in close proximity to their properties. This set in motion the process of amending a local zoning ordinance to increase setback distance from homes and other protected use structures (such as schools and hospitals) in order to better protect and respect the lives and properties of those living near oil and gas development.

By April of 2015 several bills were working their way through the Oklahoma State Legislature in reaction to a recent local ban on hydraulic fracturing in Denton, Texas. The bills proposed various ways in which local municipalities could either be sued for preventing the development of mineral rights, or reduce municipal power to regulate oil and gas activity so that

no municipality could effectively prevent oil and gas development in their jurisdiction. While the state legislature deliberated over each of the bills, the City of Stillwater decided to postpone voting on the local zoning ordinance until the state determined which bill would become law. Senate Bill 809 was signed into law by the end of May, limiting municipal authority to regulate oil and gas activity. The local zoning ordinance in Stillwater was signed into effect in early July of 2015 and offered some protections within the city limits in terms of setbacks and nuisance regulations.

All interviews with stakeholders took place in a five-month period immediately following the passing of the local zoning ordinance. Between 2014 and the end of 2015 there was an intense milieu surrounding oil and gas activity in the case study community that encompassed a wide variety of topics and concerns. This milieu (mostly related to earthquakes, but later including involvement in the local ordinance issue) lead to the emergence of a local grassroots organization which worked, in part, to organize citizens to push for the passing of the local zoning ordinance. Between the earthquakes and proximity concerns, the conversation primary shifted to policy over the course of 2015. This can be seen in the spike in coverage by topic depicted in Figure 3.

Figure 3.



As earthquake discussions increased, the coverage of legal and policy related articles began to spike soon after, while the discussion of risk increased, it remained far behind the discussion related to policy matters. The concern for earthquakes gave rise to the discussion of potential risks associated with oil and gas activity. Earthquake related articles declined as local and state politics began to take center stage in 2015, despite 2015 being another record breaking year for earthquake activity.

Various dimensions of community capitals emerge clearly in the stakeholder narratives, with some being more apparent than others. Some of the most obvious categories that emerge are political capital, cultural capital, natural capital, and social capital. Even though aspects of financial, built, and human capitals do emerge, the former categories are far more pervasive throughout the narratives. I begin my discussions by partially constructing the human capital dimensions of the case study community.

Human Capital

Some of the most important forms of human capital are believed to be both formal education and knowledge gained through experience, thus the distribution of backgrounds and professional roles provide a snapshot of the human capital present in in this stakeholder sample. The distribution of stakeholders interviewed for this study include: two (2) local activists, nine (9) mineral rights owners, eleven (11) residents with wells located in close proximity to their homes, seven (7) oil and gas affiliates, and four (4) city officials. As mentioned, this stakeholder sample is racially homogenous and highly educated with the vast majority (85%) identifying as white and holding a bachelor degree or higher (94%).

Human dimensions are central to understanding emerging dynamics in a community experiencing exposure to enhanced resource extraction technologies. Aspects such as duration of residence in Oklahoma, relationships with family or friends economically dependent on oil and gas activities, and knowledge resulting in assessments of hydraulic fracturing were key aspects of understanding existing human capital.

Exactly one half (50%) of the stakeholders reported being native to Oklahoma, while just under one fifth (18%) reported living in the community ten years or longer. When examining the responses regarding overall stakeholder perception of oil and gas activity and individual construction of associated risks, simply being from Oklahoma does not seem to matter. With nearly 70% of all stakeholders living in Oklahoma ten years or longer this study suggests that one's worldview is a more important factor, which can only partially be attributed to time lived in the state. Slightly more than half (53%) of all stakeholders mention having friends or relatives who work in the oil and gas industry, and it is likely that many more also have those social connections but did not mention them specifically. Overall, the data suggests that cultural capital and social capital have the greatest influence on stakeholder attitudes towards oil and gas activity.

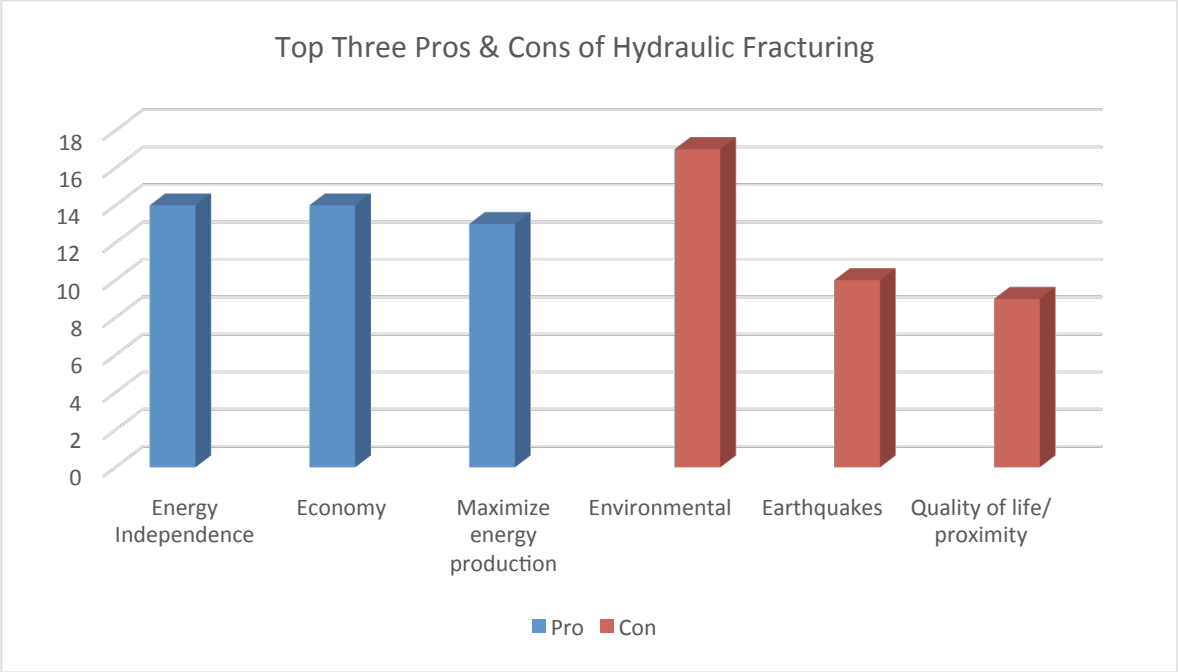
That is, how one values natural resources, as well as one's personal experience with, or knowledge of, hazardous scenarios, and who one is related to or associates with, has a significant influence on how stakeholders construct and express their views of nearby oil and gas development.

Despite half (50%) of all stakeholders reporting to be native to Oklahoma, a slight majority (59%) reported learning of hydraulic fracturing within the past five years, with slightly more than one third (35%)[4] claiming to have known about the practice prior to five years ago. Two stakeholders claim to have known about hydraulic fracturing as far back as the 1950s and 1960s. Although most stakeholders only learned of the practice in recent years, the majority (55%) of all stakeholders in the sample claim to have a basic to moderate understanding of the process, while over a quarter (27%) proclaim having a strong to expert level understanding of the process. That is, slightly more than three quarters of the stakeholder sample feel as though they understand the process well. When asked if there is anything challenging to understand about the practice a slight majority (53%) of all stakeholders report having no difficulty. Of the remaining proportion expressing challenges, most (41%) express issues related to safety and industry transparency and not the actual practice itself. A local scientist who has been studying hydraulic fracturing related issues, and has been working to educate the public, supports these findings when he describes his assessment of local knowledge regarding oil and gas development:

> You know the year before [the public forums] I had gone out to speak to a big meeting in California that was put on by the Union of Concerned Scientists and the National Science Foundation, I was just one among several that were there…they have very serious people committed to doing this, and I'll have to say that people right here in this county were as well educated about hydraulic fracturing as they started coming to the meetings. There was a lot they still needed to learn, but they were beginning to put their case together for that, and there were people salted in there that were on the other side and they were equally relatively knowledgeable.

[4] Two stakeholder (6%) didn't answer the question.

Figure 4.



When asked to make a list of pros and cons of hydraulic fracturing, the compiled list consisted of a 55:76 pro to con ratio. As depicted in Figure 4, the majority of all stakeholders identify energy independence, maximizing energy production, and the economy as the top three pros, with the top three cons consisting of environmental concerns, earthquakes, and quality of life issues. Similar to other studies, the perception of overall community impacts are mixed (Anderson and Theodori 2009; Ladd 2014; Theodori 2009, 2013). Slightly more than one third (35%) of all stakeholders claim that nearby oil and gas development has an overall negative impact, while an equal proportion (35%) believes that such issues are too complicated to say either way. The vast majority (97%) of all stakeholders believe that residents in their community are concerned about hydraulic fracturing, but only about a quarter (24%) of the stakeholder sample claim to have any health concerns for themselves or for others, despite three quarters (75%) of the entire sample reporting that other people are concerned about health and

environmental contamination. I now turn to the cultural capital dimensions of the case study community.

Using Natural Capital to Inform Cultural Capital and Risk Construction

In order to begin to answer the research question, "Do stakeholders construct oil and gas activity as a risk or technological hazard?" I must first construct the multiple cultural capital groups present in the case study community. Drawing on stakeholder narratives of natural capital, it is apparent that one's view of natural capital works well as an indicator of diverging worldviews. Just over half of all stakeholders (55%) discussed natural capital in the form of environmental concerns, with two thirds of those stakeholders (66%) expressing some concern over water conservation and preservation issues specifically. It is commonly believed that citizens have concerns regarding the possibility of subsurface migration into aquifers and freshwater horizons, however, stakeholders in the case study area are mostly concerned with the volume of freshwater usage and contamination risks related to surface spills or well-casing leaks. The latter is supported by all of the industry stakeholders in this sample, each noting these specific parts of the process as posing the greatest levels of risk for potential surface and groundwater contamination compared to the actual hydraulic fracturing phase. In other words, most people understand and agree on which phases of the process pose the greatest level of risk.

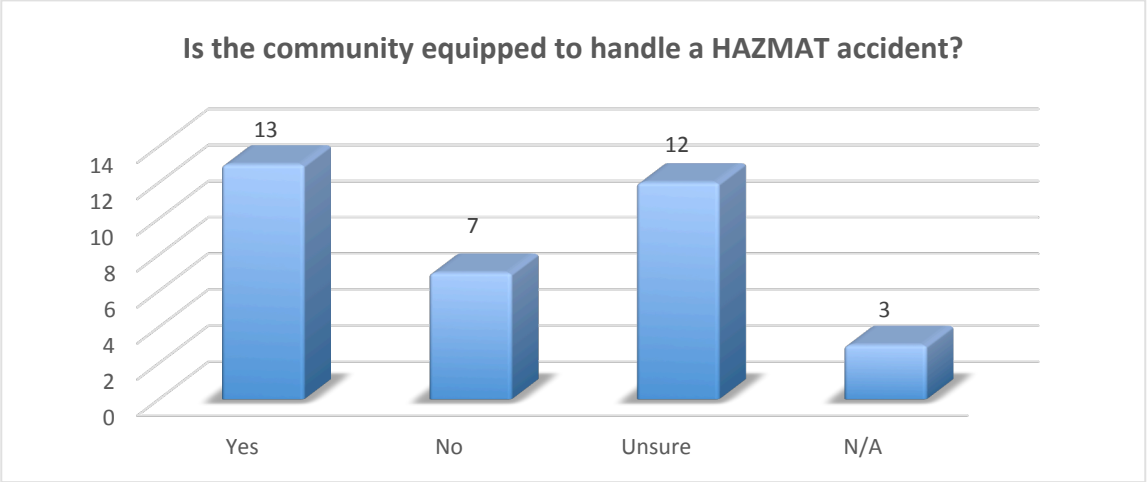
In addition to properly identifying the more environmentally risky aspects of oil and gas production, many concerned stakeholders also refer to the fact that Oklahoma is a drought prone state, and that using so much of a relatively scarce resource to stimulate wells, and then dispose of it underground, is essentially a waste. One stakeholder captures this perspective when she states "…it's all water waste…when we were in that drought and they were fracking it was so bothersome to me that all that freshwater was being wasted." While another stakeholder states, "I'm a firm believer that the next war's going to be fought over fresh water…that's the biggest

issue, we've got to protect our freshwater supply." Other stakeholders who have expressed similar concerns tend to view oil and gas activity as unsustainable long term, a perspective common to both native and non-native Oklahomans alike. Almost half (45%) of the stakeholder sample discuss oil and gas as a natural resource in high demand and readily available in Oklahoma. Such perspectives are captured with statements like, "if it's readily available, let's take advantage of it," and "to me it's like it would be to everybody's best interest…why not strive to be more energy independent." None of the pro-development stakeholders are outright opposed to alternative forms of energy, but this group often believes that hydrocarbons are going to remain a major source of energy production in the future.

Even though this relative dichotomy is actually more of a spectrum of perception, for theoretical purposes I can begin to construct at least two cultural capitals that relate to basic feelings and beliefs toward natural capital. One cultural capital group, which I call the "Pro-conservation" cultural capital group, views environmental conservation and preservation, especially in terms of water, as paramount, and that the nation should be moving towards more sustainable forms of energy production. Many in this group see nature as delicate, and that oil and gas production may pose a major threat to the natural balance causing damage that may be impossible to reverse. The other cultural capital group, which I call the "Pro-development" cultural capital group, essentially views oil and gas production as one of Oklahoma's most valuable resources, and that extracting it may not only help the United States achieve energy independence, but that the nation will also be dependent upon hydrocarbons for energy production in the future. Many in this group hold a somewhat resilient or scientific view of nature, often believing that whatever gets disrupted or damaged can recover naturally or be fixed using advanced remediation techniques. This fundamental difference in views of natural capital also overlaps considerably with stakeholder's construction of risk associated with oil and gas production.

As discussed above, a hazard is a threat to people and what they value, while risk refers to the probability that a hazard will become an emergency situation. Hazard potential is either moderated or enhanced by the social fabric of a place, which is the community's experience with hazards and their ability to respond and adapt. The manifest content of stakeholder narratives suggests stakeholders generally understand and agree that there are inherent risks involved with oil and gas production, as a sizable majority (82%) of the stakeholders acknowledge that it either is, or can be, hazardous. However, Figure 5 demonstrates that stakeholders are relatively mixed when it comes to having confidence in local HAZMAT response. Slightly more than a third (39%) of the stakeholders believe that the industry or local authorities *could* properly respond to a HAZMAT spill or well blowout, while just under a third (30%) are not certain, and nearly a quarter of respondents (24%) *do not* believe the oil and gas industry or local authorities can properly respond to such a scenario. This trend corresponds with the two cultural capital groups, as just over three quarters (77%) of the pro-conservation cultural capital group reported either being unsure or not trusting of local authorities to properly handle a HAZMAT cleanup. The pro-development cultural capital group made up two thirds (66%) of those who believed the local authorities could properly respond to such a scenario.

Figure 5.



One's experience with or knowledge of past spills or well blowouts is also an important indicator when constructing the cultural capital groups and their assessment of blame. Many stakeholders draw on regional-historical knowledge, shedding some light on the second research question, "Does the region's historical association with the oil and gas industry influence perceptions of hydraulic fracturing and stakeholder construction of risk?" On one end of the spectrum citizens conceptualize hazardous scenarios as relatively isolated, contained instances, in which the industry and local authorities have experience and are trusted to properly handle in the future. I refer to this as the "experienced view of hazard response." Here it appears that being native to Oklahoma is more important than one's view of natural capital, as the majority (64%) of stakeholders who trust that a HAZMAT scenario may be properly handled are native Oklahomans, as opposed to the less than one third (31%) of non-native Oklahomans who were either unsure or do not believe it can be handled. This suggest that simply by virtue of being from Oklahoma, residents are more likely to have had some experience with, or knowledge of, past spills and blowouts, thus influencing their perception of risk. One such stakeholder who worked for the oil and gas industry in the 1980s explains:

> Unfortunately, blowouts have happened before, and HAZMAT spills have happened…luckily they have learned from it and how to contain it and what the best practices for cleaning it all up are and making sure people aren't negatively effected.

He goes on to discuss his personal experience with a well blowout, stating, "… it took us quite a long time to get it killed. But [there were] no environmental impacts." A local oil and gas operator recalls experiencing a blowout for the first time as a teenager:

> That's one of the first things I did when I was seventeen years old working for [local company]. I remember there was a creek, there was a steel flow line that leaked and he sent us out with brooms and we swept the creek…we remediated every pit of the banks all night long to help clean up that part of the creek. And we did and there's no long-term damage, but you definitely have to get out there and work on it.

Both stakeholders view the damage as problematic, but temporary and manageable. A third stakeholder who acknowledged that blowouts and spills do happen, but are essentially not what you consider a hazard supports this idea, stating that it's more of "a temporary inconvenience" for those that live nearby. Each stakeholder is native to Oklahoma and reports having personal experience with HAZMAT scenarios in the past. This sentiment can also be found in stakeholders who are from Oklahoma and who have never been employed in oil and gas. Another native Oklahoman who recalls hearing of past blowouts simply states, "That's [spill/blowout] going to happen. Again, they know how to take care of it. It's a mess, granted."

On the other side there are citizens that view the combination of horizontal drilling and hydraulic fracturing technologies as relatively new and significantly different than any oil and gas development the region has ever experienced. I refer to this as the "uncertain view of hazard response." This group tends to express great concern over both the long-term impacts of this new technology, and that the potential for a disaster may be far larger than the industry and local authorities are likely prepared. It is common for respondents to reference other major disasters as

proof terrible things can and do occur and that the impacts can be long lasting. A local environmental scholar explains:

> I think that there is never the anticipation that a big event will occur. They are always betting on the fact that if something does occur it will be small and it will be easily controlled. But I do think that with the number of sites that are occurring and the rate at which they are going up and had been going up in the past, there is a greater likelihood for risk of something occurring. I think that even though our HAZMAT teams are trained, I don't know that they would be ready for a significant event like that.

A local activist expressed a similar sentiment stating:

> You can't clean it up. I think that what we have learned from Exxon Valdez, BP Deepwater Horizon, Kalamazoo, Michigan, the bomb trains that have exploded in communities across the country in the last two years…you can't ever take the place you spill that and return it back to what it was before that spill…I'm not saying there is nothing we can do…but it's never going to go back to the way it was.

Both stakeholders construct risk as something beyond anything that could have been experienced in the past, and view the possibility of a HAZMAT scenario as potentially one that could have long-term environmental and social impacts. Even though native Oklahomans make up less than one third (31%) of those who are unsure or doubtful about adequate response and cleanup, this small group of uncertain Oklahomans is more likely to draw upon examples of failed cleanups closer to home. One skeptical stakeholder and native Oklahoman reflects:

> …there are kids over here in the life sciences that have been measuring how many insects have come back after the Tar Creek area compared to a nearby creek, and the actual amount of insects that come to the area is ridiculously different…I don't know how you fix land that's been contaminated by saltwater.

A local hobby farmer, and also native Oklahoman, draws on another regional event stating, "The Ponca City [Oklahoma] superfund site has yet to be cleaned up after decades. They have higher rates of cancer there, and they have for a long time."

Numerous stakeholders occupy a space between the two constructed groups, as many make statements that express being unsure, but mostly hopeful, that an event won't be significant enough to be catastrophic. A local agricultural scientist also draws upon a regional example, explaining:

> There was a spill up in Hennessey where they had…I think it was hydrochloric acid that spilled, and they acidified the soil down pretty deep….they made it out to be like it was this huge deal, it's not that big of a deal. It's like you dig the soil out, you replace it, or you pull soil out and treat it with ag-lime to bring the PH back up, it's not that big of a deal. They were talking about it like it was this huge environmental catastrophe and that it was going to hurt the groundwater, but nah, it's just acid basic chemistry, very simple.

He goes on to state, "there is certainly some legitimate negative impacts that occur, but is it equal to the hype?" Nevertheless, both staunch supporters and critics are constantly vying to sway the relatively muted middle. On one end of the spectrum you have local oil and gas operators making claims such as, "You know fracking in modern day practices is really a pretty safe environment." On the other end you have local activists making counterclaims like, "I think that it's potentially one of the most dangerous technological innovations that we have seen in the past fifty years." Somewhere in between you have bystanders making the "necessary evil" claim, expressing thoughts similar to this:

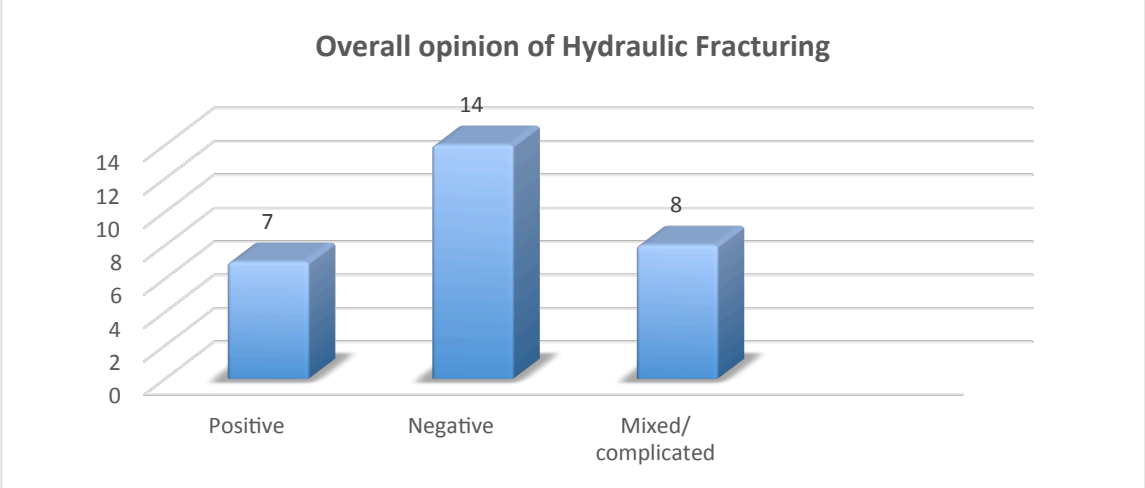
> You have got to have the oil. People that say, "Well, we don't need to have all these oil wells." Well, alright, quit driving your car and just walk to work. Try to get along without it. You can't do it. You can't do that anymore. It's not possible. You're going to have bad things happen.

Several residents in the middle came to the defense of local oil and gas operators while also empathizing with those who expressed concern. One local homeowner put it like this:

> I don't think they are out there to kill the environment either, do you know what I mean? I don't think they are out to give everyone cancer and you make them die…I mean they have a family too…

The above are prime examples of how the community capital framework can be useful for organizing a spectrum of ideas and beliefs into categories of existing cultural capitals. The cultural capitals categories help shed light on the distribution of positive, negative, and mixed opinions of hydraulic fracturing being reported in this study, as depicted in Figure 6. Although the influences of cultural capital are clearly not cut and dry, it is evident that a spectrum of cultural views exists, and while I am able to construct a variety of cultural dichotomies in an attempt to tease out themes, the reality is that the constructed cultural capital groups represent clusters of similar thought and have much overlap.

Figure 6.



Evidence exists of two prominent cultural capital groups as indicated by one's view of natural capital: the pro-conservation cultural capital group, and the pro-development cultural capital group. Both groups maintain fundamentally different views of natural capital, which corresponds with their views of oil and gas development. Even though the vast majority of stakeholders report that oil and gas development is a risk and can be hazardous, the level of risk construction differs based upon cultural worldview.

A second relatively dichotomous view relating to hazard response is also evident. The response patterns suggest that the experienced view of hazard response is related to the regions historical association with oil and gas, as most stakeholders are native to Oklahoma. However, being native to Oklahoma does not matter in terms of being pro-conservation or pro-development. Therefore, stakeholders do view hydraulic fracturing and associated oil and gas activity as a technological risk or hazard, but are split on the degree to which they view it as a potential threat.

Insofar as a HAZMAT incident were to occur, it does appear that the regions historical association influences perceptions of risk, as most native Oklahomans know of spills and blowouts that have occurred and were handled in the past, and have general confidence that they will be handled in the future. Even though a minority group of stakeholders express having health concerns relating to oil and gas development, the data indicates that such stakeholders are more likely to be pro-conservation and have an uncertain view of hazard response. I turn now to this group of health conscious stakeholders.

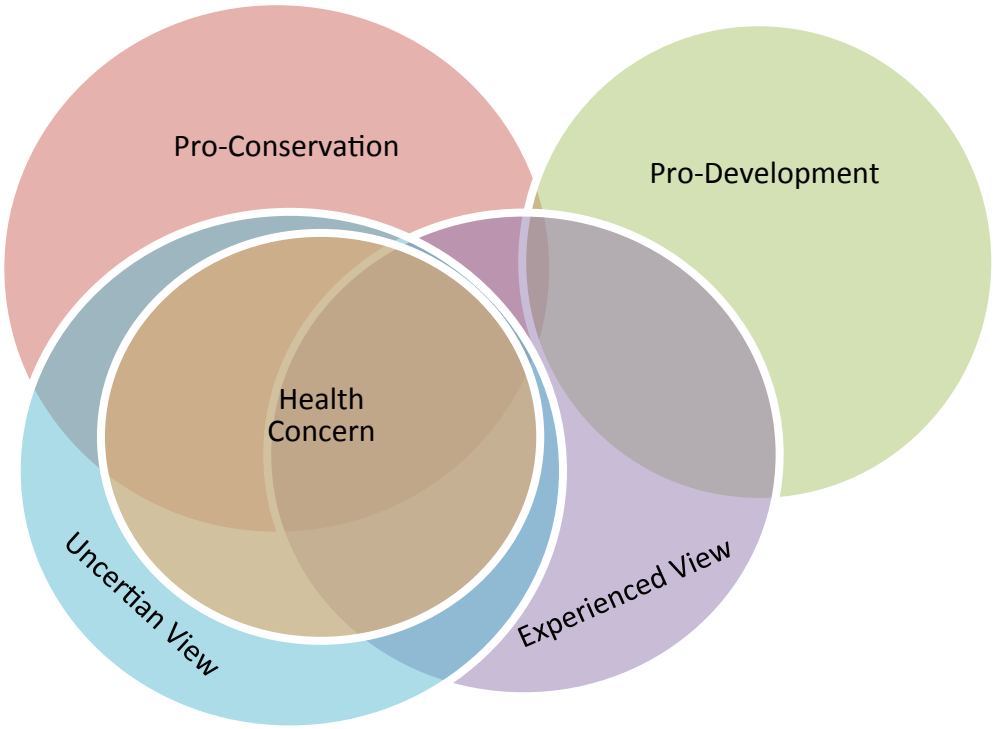
Cultural Capital and Health Concerns

Cultural construction of risk associated with oil and gas development is most prominent in terms of stakeholder perception and construction of health risks related to nearby oil and gas development. Of the roughly one quarter (26%) of all stakeholders that express having some health concerns[5] for themselves or for others, all (100%) of them fall into the pro-conservation cultural capital group, while all of the (100%) stakeholders who fall into the pro-development cultural capital group report having no health concerns at all. However, the relationship isn't perfect, as just over one third (36%) of the stakeholders who fit into the pro-conservation cultural

[5] Health concerns refer to a mixture of personal health concerns (experiencing new allergies, fear of both being exposed to contaminants or becoming exposed at some point without knowing) and a broader sense of fear for the health and welfare of citizens that live near oil and gas operations, especially for children and the elderly.

capital group also reported having no serious health concerns. Even though nearly three quarters (64%) of all stakeholders report they are not concerned about health related issues, those that do, feel it intensely. The relationship between health concern and the constructed cultural capitals categories are illustrated in Figure 7. All of the stakeholders that reported having some health concerns shared the uncertain view of hazard response, while just over half (52%) of the stakeholders who report having no health concerns shared the experienced view of hazard response. Of the 26% expressing health concerns only two were native to Oklahoma.

Figure 7. Cultural Capital Categories and Health Concern



The health conscious stakeholders in this study are mostly afraid of the unknown. They are typically unconvinced that these relatively new extraction practices have been proven safe, and they commonly believe that we may not know the true extent of health impacts for many

years to come. Most health conscious stakeholders realize they are in the minority, which contributes to a great sense of frustration. As one stakeholder expresses:

> People are concerned about earthquakes, property value, and about pollution and noise and traffic. And I feel like some people should be more concerned about health, but they are not.

This stakeholder falls into the pro-conservation cultural capital group, holds an experienced view of hazard response, and represents one of the two concerned native Oklahomans. A local activists who fit the pro-conservation cultural capital group, shares the *uncertain view* of hazard response, and also has health concerns, explains how she struggles with the uncertainty of health risk while understanding the lack of concern prevalent in the community:

> Even as convinced as I am, I still have moments where I look around and I'm like, "everything looks fine! I'm breathing the air. It smells fine. I'm drinking water. I'm not deathly ill."…It's easy not to be concerned about it…I'd say most people, based on the evidence that they just see on a daily basis, aren't concerned.

Some believe that there are more concerned stakeholders than it seems, but that people are afraid to voice those concerns for fear of being ridiculed. Another activists who fit this same pattern claims:

> I do think people are concerned about their health, I think they just aren't super sure how to talk about it. Because they think industry makes people who make health claims sound crazy.

Although the above quotes articulate some of the ways those with health concerns reason why others do not share those concerns, it is more common for stakeholders to believe that many people simply choose to ignore the risks associated with health "because we don't know." This sense of not knowing seems to be a source of blissful ignorance, or comfort, for some, since there hasn't been any proof of contamination. At the same time this idea of not knowing is a point of major concern for others, as some feel that the community may be exposed to something dangerous, but that it may go undetected until it's too late. This idea manifests itself in the way

that some stakeholders have grown increasingly suspicious of otherwise seemingly normal patterns of illness or allergies. Stakeholders who fall into the pro-conservation cultural capital group, hold an uncertain view of hazard response, and have health concerns, express similar fears regarding health. One such stakeholder ponders the medical issues of a friend's daughter:

> Her immune system is compromised, and so any kind of contamination in her environment could be really terrible for her more than other people…all we know is that something changed in her, something changed at this particular period of time…I don't know

Another stakeholder with similar attributes, views local patterns of asthma with suspicion:

> [Community] has really high rates of asthma among children, and I always…for enrollment verification you have to go in and verify your kid's enrollment…I mean there are always just a line of people having to check in their child's inhalers…people often times say *oh no, it's because of allergies here,* but I can't help to think that there are extraction industry related things that could also be enhancing our rates of asthma.

A third stakeholder located next to a major oil and gas operation, and who also fits this pattern wonders about her own health issues:

> I've never had allergies and breathing problems like I have in the last year. And then people say *well as you get older you develop more allergies.* Well sure, and if you introduce more pollutants you're definitely going to have more. My big concern is, eventually something always tips the scale…I mean you could be doing fine with everything and then one day just one more pollutant is going to tip the scale

Although many of the more health conscious stakeholders report pondering similar kinds of health connections with the region's oil and gas activities, the narratives demonstrate that it is also common for stakeholders to acknowledge the complexity of health issues and the difficulties involved with proving causation, even if there were evidence of a spike in illnesses. A fourth stakeholder who also has these attributes (pro-conservation, uncertain view, health concern) explains:

> My spouse about three years ago had surgery for breast cancer. There is no history of breast cancer in her family. It was a kind of breast cancer that has an estrogen marker, and petroleum contains estrogens. I can't prove fracking is the cause. The internal combustion engine is probably to blame for more pollution than fracking. I drove in a gasoline-powered car to come over here for this interview. That's why the whole thing has to change.

This view is common among stakeholders who fit into the pro-conservation cultural capital group, shares the uncertain view of hazard response, but has *no* health concerns. One such stakeholder voices a similar concern when she wonders incredulously:

> The only thing that I've heard is to watch for certain things, like watch the elderly, watch the young for headaches…but how many things can be attributed to getting headaches and getting sick? You know? I mean can you prove it?

A former oil and gas operator with the same attributes, explains that one of the reasons he hasn't been driven to activism is that his water wells have yet to be compromised. Therefore, while he is concerned, there isn't enough local evidence of harm to justify speaking out. However, this response is more typical for stakeholders on the opposite end of the spectrum (pro-development, experienced view, no health concern) regarding health. A local oil and gas operator, who falls into the pro-development cultural capital group, holds the experienced view of hazard response, and has no health concerns, reasons:

> His entire life and my entire life we have been exposed to oil and gas and the vapors, you know… It's like [if it were a concern] you would have rig workers filing law suits and everything because they are covered more than anybody else for ten to twelve hours per day.

A local authority figure also fitting this pattern holds a similar position, stating, "I would say it's been going on for a long time and if there was big side effects I think we would have seen them by now." Another local authority figure that lands on the opposite end of the spectrum demonstrates contrasting concerns, stating:

> Personally, I am very concerned about the health effects. I feel that time will tell. When we start having epidemics, or new diseases or anything cancerous that starts cropping up in areas where people were exposed to certain chemicals and

> contaminants in the ground, which can seep into groundwater I genuinely, believe our kids are going to suffer someday.

It is clear that there is a small group of stakeholders who have some very serious health concerns, while the majority of stakeholders simply don't see enough local evidence to justify such concerns. Observing where health conscious stakeholders are situated in relation to the separate, but overlapping cultural views, the data illustrates that cultural capital is closely related to perceptions of risk regarding health. Stakeholders who are generally pro-conservation and hold an uncertain view of hazard response overwhelmingly view oil and gas activity as a potential threat to the community's health. Even though respondents indicate uncertainty about whether they are currently being affected, evidence suggests that many are growing increasingly suspicious of seemingly normal patterns of illness. The roughly one quarter (26%) of stakeholders who express having health concerns would likely become claims makers if in fact a major accident were to occur. For now many ideas exist as silent claims that some individuals ponder over as they struggle to make sense of the patterns of sickness and illness around them, often not feeling confident enough in their suspicion to sound the public alarm. Since only two of the stakeholders expressing health concerns are native to Oklahoma, the data suggest that the region's historical association with the oil and gas industry may also be a major factor, as many natives generally believe if health were a concern effects would already be seen.

While a minority of stakeholders construct risk in terms of health, a much larger proportion construct risk as a threat to quality of life. The threat has more to do with proximity and property rights issues, as nearby by oil and gas development is seen as a nuisance that has disrupted lives and invaded neighborhoods. I now turn to the industrialization and proximity issues that emerge in the narratives.

CHAPTER V

INDUSTRIALIZATION AND PROXIMITY

In this chapter I discuss what stakeholders are most concerned about: property rights and quality of life issues. I begin by briefly describing the issues as a source of major concern for a large portion of the stakeholder sample, and I discuss the aspects of nearby oil and gas activity that stakeholders find most troubling. Next I address the social tensions surrounding issues of property rights, revealing some of the deepest social fault lines within the case study community. Finally, I examine the narratives of communication among stakeholder groups and reveal evidence of corrosive community.

Proximity: "I mean, literally, you could throw a rock over there and almost hit it."

Clashes occur most when the topic shifts to property rights, a source of much of the social tension and evidence of the deepest of social fault lines in this study. One of the major issues emerging in the stakeholder narratives is the industrialization of neighborhoods. It is interesting that while only 12% of my stakeholder sample mentions quality of life issues as one of their cons, roughly half (51%) of stakeholders discuss quality of life issues at length in their interviews. Almost half (44%) of respondents discussed concerns related to industrial

encroachment even though only a third (33%) of the stakeholders in the sample actually report living in close proximity to oil and gas activity. The vast majority of stakeholders (80%) that emphasize negative quality of life impacts fall into the pro-conservation cultural capital group and hold an uncertain view (73%) of hazard response, while less than half (40%) discuss having health concerns.

The vast majority (82%) of the stakeholder sample report having anywhere from a basic to an expert level of knowledge about hydraulic fracturing, despite more than half (59%) of all stakeholders claiming to have learned of the process within the past five years. The narratives reveal that most people feel they understand the process well enough to follow what is going on around them. I have discussed some of the complexity regarding overall views of natural capital, trust for hazard clean up, and general health concerns, it is important to note that the majority of stakeholders who live near a well did not elect to, and resided on their property prior to any activity. As oil and gas production surged over the past several years, many of the stakeholders now find themselves living in close proximity to an industrial zone. As one stakeholder put it, "The issue now is that there are sites in proximity to everybody. There is nary a place you can go in Oklahoma that you aren't within a certain distance from a wellhead."

Nearly three quarters (73%) of the stakeholders discussing industrial encroachment live in relatively close proximity to a well. However, stakeholders in the case study community are not *only* upset about the proximity of the sites, but that development often appears without warning, the landscape they value is being vastly altered, and that the intensity of operations becomes so great at times that it feels unbearable to stay at home. Proximity is a major issue in the sense that it is highly disruptive to people's lives, with most of them feeling powerless to do anything about it. One stakeholder empathizes with a couple that presented at a local city council meeting expressing their concern:

> I remember a rural couple that presented a slide show of a really obnoxious looking industrial installation, right there on their dream farm. They were tired, and they didn't want to be there anymore. They can't sell the farm. That resonates with me, too. How could I sell my home with a platform right there? I couldn't. There goes your savings. For a homeowner, that's you major savings plan right there.

The idea that one's home is not only their sanctuary, but also that it is one of the most major financial investments a person will make in their lifetime is a concept that underscores most residents' outrage. Part of the frustration stems from a sense of loss of control of their surroundings, as many stakeholders chose to live in a particular location only to one-day wake up to find the entire landscape around them transforming. One stakeholder who is now lives hundreds of feet away from a well reflects on why she chose her home in the first place:

> I felt very safe. I felt like we had hit the jackpot because we are in a neighborhood real close to town but when you look outside you feel like you are in the country…that was a huge selling point for us.

Another stakeholder who recently began building a new home out in the county expressed a similar sentiment as she laments the rapid transformation of the countryside around her:

> I sought out a peaceful place. I could build up high and have a great landscape, and then shortly after we got that up, all of a sudden there is just an industrial wasteland out there…that's what I see when I look off my balcony now…So it went from a little corner lot to something that's a mile long now. So there is probably a fleet of fifty trucks out there…and I think they build the drilling rigs, they also have injection wells there, and you can usually hear at least eight diesels running all the time throughout the night, the generators…

A third stakeholder, who also lives out in the county, recounts a similar experience:

> When we first moved out there, what we really liked was our neighbors were mostly cows. We basically saw cows and trees when we moved out there, and that was pretty awesome. And then all of a sudden, the pastures, all the green stuff is going away. And they literally scrape it until everything's dead and it's just bare dirt, and then they bring in gravel. And then they bring in the drilling rigs, and those things just go.

Several other stakeholders who live on the edges of town recount moments of shock, loss, outrage, and surprise as drilling activity began occurring behind their homes. A forth stakeholder recalls this transition:

> One of the reasons we purchased our home was because of the natural environment and beauty behind our home. We hear wildlife back there, we hike in the woods behind our home, the land was privately owned but there really hasn't been anything going on back there since we bought our home…last fall all of a sudden we started hearing all of this loud nose back there and it got worse and worse. A drilling rig was put back there, probably about 300 feet from our home…the noise was horrendous, the lights were bright, it was just this constant noise that you could not escape, and we had no notification that this was going to occur.

A fifth stakeholder simply states, "It was jarring to drive into the neighborhood and see this lit up huge rig back there in the woods behind our home." Several other residents make statements like, "I had no idea that they could start drilling that close…I never thought that could have happened right there."

Each of the residents quoted above fall into the pro-conservation cultural capital group and share the uncertain view of hazard response, while only a couple express having health concerns. With so many residents valuing the natural beauty of the environment, the narratives demonstrate that many of them sought out a peaceful place with a beautiful landscape to settle down and live. Hardly any of them believed any sort of industrial development could occur so close to the locations they chose to reside, and most of them express being somewhat nervous over the possibility of an industrial accident, such as a well blowout or surface spill, occurring in such close proximity to their homes. Therefore, it is likely that it is something more than simply being in their back yards that bothers these stakeholders, it is more of a quality of life issue in which residents sought out a safe, quiet, visually pleasing place to live, often in locations where they believed nothing like this could occur. The arrival of drilling equipment is shocking for

stakeholders, as the environments they thought they had chosen is suddenly being disrupted. A local oil and gas employee attempts to empathize with such stakeholders when he states:

> You know, they're like "I don't want to look at the rig," well there's not really an argument for that. It's that you just don't like the look of it and it is right by you. To me there is no argument for that, it's just that's a fact, they don't like it and it is there. I understand that.

It would be remiss to characterize this sentiment as simply an "industry perspective" as this is a similar understanding to anyone who does not have to live within proximity to these operations. A stakeholder who is not industry affiliated, and whose son lives near a well, also shares this perspective:

> They drilled a well right behind the kid's house, I mean, literally, you could throw a rock over there and almost hit it. That was pretty noisy to them. And the lights were on all the time. I told them, I said, wait, after about a week when they're drilling out there, you'll get so used to it that by the time they shut that all down, you won't be able to sleep because it's too quiet. And sure enough that's exactly what happened.

Many of the stakeholders living in close proximity to oil and gas development mentioned being met with similar comments when expressing their concerns or displeasure with their newfound living situations. This sort of dismissive understanding, or hollow empathy, tends to fuel anger and frustration in those whom feel they are being affected. The following statement is indicative of such frustration:

> The thing is, until you live around this crap, you have NO clue what it's like…. It's like until you're in the middle of it and it's all around you and it never ever ever stops, you can't even conceive what it's like…it gets to the point where it's pervasive. …It's just all over. You can't get away from it… We feel like it kind of fundamentally changed the way we experience where we live.

It is not simply the nuisance of noise and light that many of the residents mention, but rather this fundamental shift in how they experience their own private property that is most important. The same county resident expresses this sense of loss as she recounts witnessing everything around her change:

> To go from somewhere where you would sit out there, and people would be kind of freaked out because it was so dark…but you could see the stars, you could see ALL of the stars! And then, all of a sudden, there's this big industrial site throwing light everywhere, and there's the noise, there's the activity, and then comes the trucks. Constant trucks…so everything in your house is dirty, because they are throwing dust up constantly. Every time it rains, the roads have these big deep ruts…and it really just changes the entire quality, you go from living in this nice, quiet kind of bucolic setting to being in the middle of an industrial zone.

Other stakeholders, who either know of someone affected or live close enough to empathize but not enough to consider their selves affected, express greater levels of empathy. A resident from an unaffected part of a neighborhood states:

> …they probably bought that place for the same reason we bought this place, because of what's behind us…or what is *not* behind us…you walk out the front door you have got city and you walk out the back door and you got the country…that would probably bother me too…

Another unaffected, but concerned stakeholder in relative close proximity to drilling activity also empathizes:

> It would be devastating for me. They have lights on at night, I think maybe they kill all of the trees in the area, they have trucks and noise going, so there are so many reasons why no on earth would never want to live near a fracking site.

However, not everyone expresses this degree of support. Some perspectives are far more pointed and are representative of the tensions and frustrations surrounding these issues. One oil and gas operator states bluntly:

> Yeah I know you moved there because you have a view but you didn't own that view, and if you want to own that view you have the right to purchase that property or whatever. But that's still someone else's property and you don't own it. We have to understand that…in this country, unless you want to change the laws of the entire country, the mineral estate supersedes the surface estate…with that being said, yes there does have to be a balance. I shouldn't be able to just come in and drill right next to your back yard.

Many affected stakeholders have expressed a desire to relocate, but packing up and moving may not be an easy task as many homeowners are concerned about their property values

and the marketability of their homes. One stakeholder was still in the process of building her dream home when oil and gas activity ticked up.

> I got through about half way building and quit. I don't want to build out there, I don't want to live by this drill yard…I don't think I can sell it…I've been a homeowner twenty five years, and I don't want to own property here anymore.

Several other stakeholders express similar loss and are largely unhappy with their current living conditions, although they are often reluctant to move. On the one hand many of them feel they won't be able to sell their homes for their ideal asking price, and on the other hand they fear that there is no guarantee the same thing won't happen at the next location.

> We've always lived out in the country, for almost forty years, and that was something that never occurred to us that could happen so close to a place that we lived. We always thought that we might someday want to buy land and be back out in the country again, but honestly, I would be terrified that we might put some of our hard earned money into a beautiful piece of property and we could wake up one day and there could be a drilling rig next door to us.

A stakeholder couple, which was not directly affected, expresses similar concerns:

> We were lightly toying with the idea of maybe [moving]. We would like some land, but I'm half scared to because I don't have a good enough understanding of the rules and regulations. After this happened I would be afraid that if I had two or three acres, ten acres…Joe drilling could come in and I would be looking at a stinking pump.

It isn't always clear whether or not stakeholders held their views of natural capital and hazard response prior to drilling activity occurring in close proximity to them. The data shows that they hold such perspectives now and that competing views often lead to a sense of great frustration and tension. While less than half of the stakeholders located near oil and gas activity express any health concerns, the vast majority certainly value their own private property and are concerned with what goes on around it. However, the ways in which private property is defined, issues regarding surface rights and mineral rights, and the combination and conflict associated with these rights lead to some of the most elevated levels of frustration and anger in the

stakeholder narratives. Property rights issues not only enrage individuals, but competing views and values often lead to tremendous tension and even evidence of social corrosion. The narratives demonstrate that perceptions and competing values of private property rights are the location of the deepest social fault lines uncovered in this study. I turn now to the issues of social tension and property rights.

Mineral and Property Rights

Property rights issues are one of the major points of contention with oil and gas development due to the fact that mineral rights and surface rights are commonly divorced under Oklahoma statutes. This means that someone can own the minerals under another person's land and lease them out for development while the surface owner receives little to no compensation. Typically this situation is depicted as a scenario in which the surface rights owner either owns the mineral rights or does not, which is commonly interpreted as residents are either receiving large sums of money or they are not, while those that receive nothing still have to incur all of the negative aspects associated with development. It is common to hear statements like, "They're not going to see any money for it but still have to deal with the noise, the lights, all the trucks," and, "I've talked to them and they said 'yeah, if we had mineral rights it would probably be different.'" This perception can also be a source of tension when nearby non-compensated property owners have neighbors that believe they are getting rich when they are in fact receiving little or no compensation. One stakeholder with an oil well roughly three hundred feet behind her property explains:

> Some people had said when the wellhead appeared over the roofs of our houses, "ohhh, you've got a rig back behind you, you must be making mint.' No. We were not making mint. We were having all of the risks with none of the benefit…

Such perceptions are rather common, yet a few stakeholders in this study provide narratives that illustrate how complex and frustrating conflicting property rights situations can be. The source of this complication can be largely attributed to the way in which mineral rights are often inherited and subdivided over generations, as one mineral rights owner explains:

> So surface rights and mineral rights are divorced in a large portion of the state. And then they get subdivided, because the heirs get them, and then they get divided among the heirs, and then pretty soon you've got a ten acre tract divided amongst five kids, and if all of them have three children and they leave them to their children, then pretty soon you've got a whole bunch of people who have like .1025 net mineral acres…my point is owning mineral rights does not necessarily mean you're making any money.

Thus, often those that own mineral rights own a minority share, and not everyone who receives some sort of monetary compensation believes it is worth the hassle, especially if you view land as natural capital that is to be preserved rather than handed over for industrial development. Two respondents in this study demonstrate that development does not always guarantee satisfaction, even in cases where stakeholders are well compensated.

Just over a quarter (27%) of the stakeholder sample reports owning mineral rights, and almost half (12%) of these stakeholders also own the surface rights and are currently leasing their property. Most of the stakeholders report owning a minority share of mineral rights (some didn't go into detail), although that portion varies widely among stakeholders, as some own a lot more land than others. Therefore, the compensation stakeholders report receiving ranges from less than $100 per year if they own a small share on few acres of land, to upwards of $40,000 in payments if they own much larger tracts of land and also have wells and pipelines installed on their property. Based on conventional logic one would assume that those receiving greater compensation would view oil and gas development more favorably. However, contrary to popular belief two of the three respondents in this study that received the highest reported compensation also report being the most devastated by oil and gas development on and around their property.

While this is certainly not enough evidence to make generalizations, it does provide us with several examples that simply being highly compensated isn't always the most desirable option.

Of all of the compensated mineral rights owners, only one reported receiving large sums of money and being satisfied, while another reports seriously wanting his land developed but that oil companies are not interested in his land because there aren't enough viable reserves under his property worth developing. Stories of mineral rights owners getting wealthy from leasing their mineral rights are still relatively common throughout oil and gas producing regions, which is where the idea that simply owning mineral rights translates into significant income comes from. A local scientists/extension agent recalls such an account:

> I had a farmer come up to me a couple of years ago and I would see him at meetings and sometimes we would get together out in the field to talk I'd help him with policy and his farm budget and stuff, and he would always be lamenting about how bad things are and how tough it is to make it in agriculture. I saw him at this meeting about two years ago and I was awaiting to hear this sob story and he said, "[omit] I will tell you', he said 'because of all this hydraulic fracturing I got so damn much money I don't know how to spend it. I've hired two lawyers and three accountants, and my wife and I are trying to figure out where we are going to go on vacation overseas this year. Last time we did that was before the kids were born." So that story is real large across the country and in the oil patch...

However, in this study I encountered no such cases. Four of the mineral rights owners in my sample reported not wanting to have their land developed at all felt they had little choice in the matter. Not surprisingly, the one satisfied mineral rights owner, and the mineral rights owner that wanted development, both fall into the pro-development cultural capital group, share an experienced view of hazard response, have no health concerns regarding oil and gas development, and are both native Oklahomans. The mineral rights owners who received large sums of money, but did not want their minerals and surface land developed, each fall into the pro-conservation cultural capital group. However, both express a mixture of experienced and uncertain views of hazard response, have little to no concern regarding health, and are also native Oklahomans. In

both cases cultural capital views of nature explain their respective positions on this matter more than simply being from Oklahoma. In short, the pro-development mineral rights owners both valued oil and gas as a commodity and a source of financial capital and are trusting that there will be no serious environmental harm. The pro-conservation mineral rights owners valued their land more than the monetary compensation, wanted to preserve the natural beauty of their land, and did not want to lease it out to industrial development.

One of the highly compensated mineral rights owners, which I refer to as "Landowner A," expresses frustration with the conventional wisdom that those that are not compensated are simply angry with, or jealous of those that are being compensated.

> I've talked to people who are in the production side of it, and some of them are also mineral rights owners, and they sort of act like it's sort of a haves vs. have not's scenario, where it's just people who are bitter because they don't own mineral rights. Well, guess what? We own some mineral rights…but it hasn't been enough to make it worth the change in our quality of life…I would give that $2000 to have those trees back. I just would.

It is commonly believed that when oil and gas companies want to lease the mineral rights for development the mineral rights owners have the ability to negotiate compensation, which also implies they have the right to refuse. However, because none of these stakeholders own majority shares of the mineral rights they have no real leverage in resisting the development of their mineral rights and surface land. In such cases stakeholders feel their most rational option is simply to comply in order to at least gain some control over how their property is going to be altered. The other frustrated, highly compensated mineral rights owner, which I will refer to as "Landowner B," explains:

> They have got a process that is foolproof, and if you don't go along with what they are wanting to do, at some point in the negotiations they just pull negotiations and then go down and put damage money with the Corporation Commission and in twenty four hours they've got a license to come drill your land anyway… I tried to stall as long as I could, but then it comes down to it they

> were going to do it anyway…so we worked all the details out, and signed the paper work.

Both stakeholders have an interesting thing in common, that is, while both wanted nothing more than to be left alone and their land to remain intact, they felt forced to sign an agreement and at least receive something rather than have it happen anyway and receive much less or nothing at all. As Landowner A put it, "People who say no, who are like, 'No, I'm going to stand by my principles' always regret it and they get screwed in the end." A third stakeholder, and minority mineral rights owner who received far less compensation echoed this perspective, stating:

> We want to stand firm. But then we know that they're probably going to go and do what they want anyways, so do we just say yes and make a little bit of money off of it, knowing that they're probably going to go and do it anyways, or do we stand firm and make a point?

It is estimated based on the information provided in the interviews that these two landowners received somewhere between $20,000 and $40,000 to allow wells and pipelines to be installed on their property. Landowner A explains why her family gave into negotiations:

> It was something where we knew that everyone around us had already agreed, so it would be forced pooled, so we went ahead and agreed…they'll say, "Well, it's voluntary! People are signing these agreements." But here's an example…we have two pipelines across our land….I think we ended up with somewhere between sixteen and twenty thousand dollars for the total. Which is a decent chunk of change. However, what you have to do for that is they tear up your property, and they have a permanent easement that goes like thirty feet on either side, and you can't build anything on that, and you have to agree to defend their easement into perpetuity…you have to let them put gates in your property, and they have to be able to access it wherever they want…

Landowner B describes his experience when trying to resist such negotiations:

> [The land man], he was like "well this can go the bad way." He let me know that this is the good way, there can be another way this goes down. And then when my lawyer told me what the other way is I was like, "oh, well I don't want this to go the bad way." But in the end it was kind of like if you don't agree, if you stay in line, then it's going to go the bad way."

This stakeholder voiced his concerns and tried to resist, but in the end felt he had no better option than to settle. Even though he received a relatively large sum of money, he explains that the land was worth far more to him and his family:

> They knew how I felt about the piece of property and how it had been in our family for a long time and it was kind of where we vacationed and went hunting and fishing and spent family time. So it was a special piece of property and I didn't want it becoming an oil field…

This has led to both landowners feeling a great sense of loss and anger towards the industry, as they feel virtually powerless in being able to control what happens to their own property. Landowner B expresses his frustration:

> It's gotten to the point where I don't even want to go out there, it makes me too upset to go out there, I can't enjoy the property…you know I grew up out there. And so I was used to things being a certain way…I wish they would just come and buy my property…then you can put twenty wells out here for all I care…

Landowner B's wife goes on to say:

> It was really hard because…. There is a strong sense of stewardship with this property because his grandpa bought it, and they spent family time, and are very religious, so stewardship of the land…and it's like crap, we can't…we didn't even get to choose

Landowner A depicts a similar sense of loss and frustration:

> There were these big pecan trees, we're talking probably hundred year old pecan trees. When we moved out there, there was basically a tunnel of pecan trees that covered the road. And you would turn onto this land, and it was kind of this dappled shade, and you're driving under this canopy of trees…then the oil companies come. They want to bring a pipeline through aunt [name]'s pasture. So what do they do? They come in with a bulldozer, and they knock over all these hundred year old pecan trees. Do they harvest them? Do they send them for firewood? Do they do anything? No, no, no. They dig a big ditch, and they shove them all in this ditch, and then they have these blowers that produce an air current and they burn them to cinders and then they pile dirt on top of them…. What really bothers me is the sense of blatant disregard I feel like that displays, and I think that's what really gets to me about the whole thing. Because it's just kind of like, you're there, and if you object, you have any questions, if you don't like it, you're just obstructing progress.

Despite the seemingly generous compensation each landowner received, they both share the belief that their land is worth more than any amount of money, and that they lost far more than what they received. However, other people in the community often view this sort of development and compensation as hitting the lottery, seeing these stakeholders as fortunate, often leading to misunderstandings and misconceptions of what in fact their experience has been like. Landowner B provides an example:

> We have friends that live right on the property that is adjacent…they're like "we hear that pump all night"…and we have to be like, "Yeah sorry. Guess what? You're getting another one." Which stinks because we can't do anything about it for other people…people are like "I can't believe you are doing that." And we are like "we are not doing it. We don't want to!"…so it makes us look like we just want money and we are putting a lot of wells on our property and that is not what it is…They think the amount that I'm getting compensated is way more than what I'm getting…I got a Honda Civic! A loaded Honda Civic, is what I got in compensation for all this.

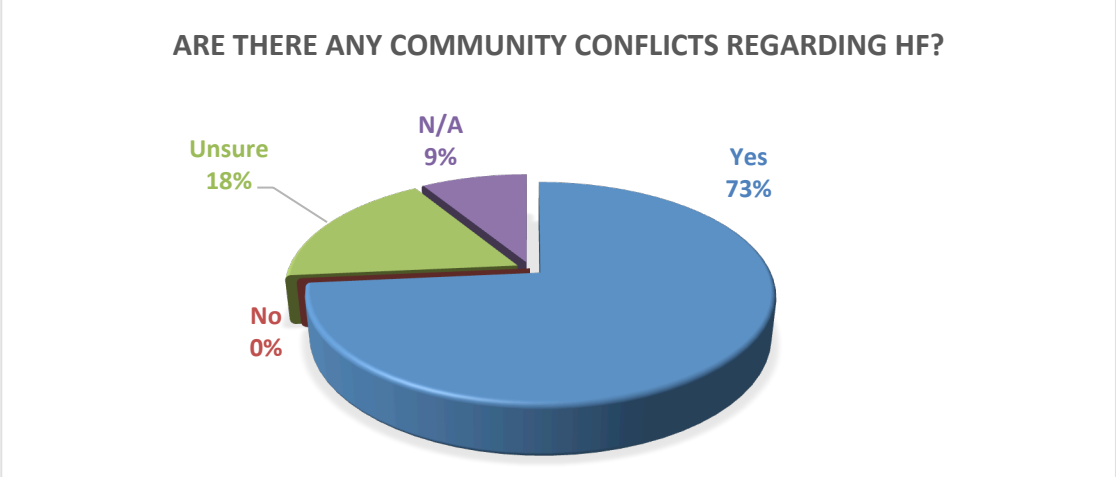
Much like the stakeholders that expressed having health concerns, the experiences of stakeholders who have found their lives disrupted by nearby oil and gas activity also feel as though their issues are being dismissed or oversimplified. Those that do not experience living in close proximity often reduce their concerns to simply not wanting to be inconvenienced by noise and light for a short period of time, while most of those affected stakeholders feel as though their living experience at that location has been fundamentally altered. Property rights and quality of life issues reveal some of the deepest social fault lines found in this study. I now turn to the social dimensions and examine the evidence of social corrosion in the case study community.

Social Capital and Communication

Social capital involves mutual trust, reciprocity networks, groups, collective identity, and a sense of a shared future (Flora and Flora 2008). Technological disasters are known to erode social ties within the community through the process of claims and counterclaims making, in which accusatory language is hurled toward individuals or groups engaging in this

claims/counterclaims process. The negative labeling of individuals and groups is known to heighten the emotional intensity of the conflict, playing a key role in the breakdown of social ties, sometimes resulting in what is known as corrosive community. The constructed cultural capital categories and perspectives demonstrate that there are multiple social fault lines within the community in terms of feelings and perspectives toward oil and gas development. The spectrum of views illustrate growing tension amongst many of the residents revealing diverging views of the future, incongruent collective identities, and involves a mutual suspicion between groups holding viewpoints on the more polarized ends of the spectrum. Even though there has yet to be a disaster scenario, and there is hardly enough information to depict the existence of corrosive community, the data uncovers moments of heightened emotional intensity and suggests that there are signs of corrosion within the case study community.

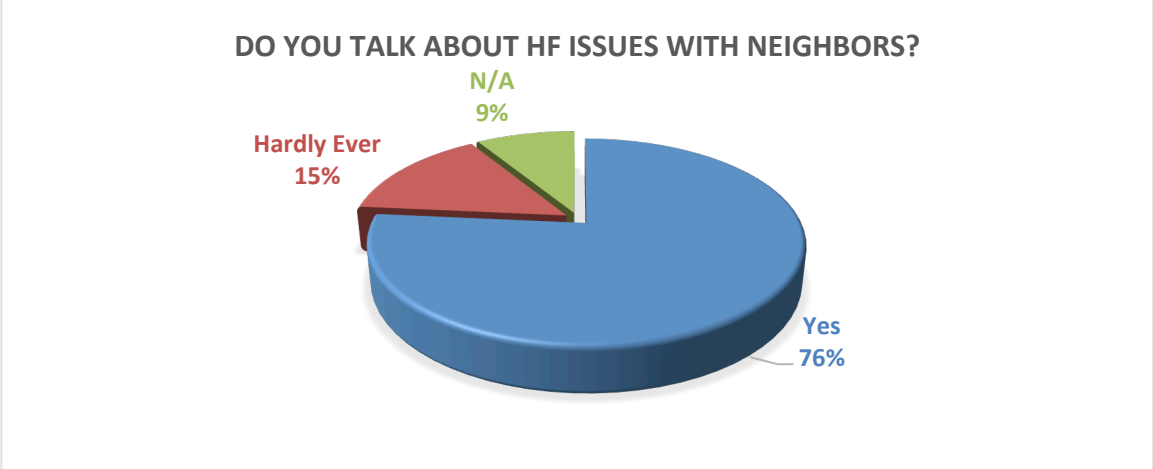
Figure 8.



Nearly three quarters (73%) of the stakeholder sample believe that there is conflict in the community regarding hydraulic fracturing, while roughly the same proportion (76%) report having discussed issues related to hydraulic fracturing with their neighbors, as depicted in Figures 8 and 9. However, what has been acknowledged as conflict, is often simply the recognition that tensions exist elsewhere in the community, as few stakeholders were able recall any specific

confrontations that they heard of or experienced personally. Stakeholders report "talking" about such issues, yet the data shows that it is more common that residents work to avoid conversations that could potentially get tense or awkward. Despite most stakeholders reporting that they speak with neighbors and friends about related issues, they also commonly report that conversations are typically superficial. The narratives reveal that such interactions commonly amount to nothing more than water cooler talk about the most recent earthquake. It turns out that individuals usually buffer tension by electing to only discuss controversial oil and gas issues with like-minded individuals or relatively apathetic parties.

Figure 9.



When stakeholders from different ends of the spectrum come into contact with one another to discuss these issues, tensions often peak quickly. In conversations, parties generally feel as if their points of view are being ignored or dismissed as simply incorrect, and commonly deem interactions "pointless" and "ideological." Stakeholder views of opposing groups commonly mirror one another, with each party believing the other refuses to have a "fact based" discussion. One stakeholder captures this dynamic when she states:

> You have people who are very concerned about fracking. They're concerned about the practice, they're concerned about the chemicals that are used…they get

> concerned when it gets really close to them. And then you have people who are just like, "Drill, baby, drill" … For some people, it's part of being a good American and then for other people it's like they're poisoning the earth. And then you've got people kind of in between who are just like, "Ugh, both of you guys, stop!"

While it is clear that multiple opposing cultural capitals exist, a middle ground of individuals who mention having close ties with people on both ends of the spectrum also exist. However, no matter where one stands on issues of hydraulic fracturing, the more extreme ends of the spectrum are the most obvious to anyone who has attended a public meeting. A city councilor describing the public forum portion of a city council meeting addressing the local zoning ordinance explains:

> When we were doing the ordinance, it was one side was very far and the other side was very far and it was hard to find the middle. Both sides were saying there was nothing happening or everything was happening, and so you have got to figure out what is important and what is true, what is factual, what is based in science, and what is based in theory.

A local oil and gas operator also reflecting on the city council meetings provides a similar account:

> It was no doubt civil, but there was no doubt that there were some preordained ideologies that were not going to be changed… There is a spectrum that no matter what the facts are, they are always going to stick to that ideology…

A second oil and gas operator echoes this sentiment, stating, "I think the industry is trying to talk to everyone, but everyone has already made up their minds." He goes on to describe feeling personally attacked by those deemed to be on the other end of the spectrum. Such perceived attacks only heighten the tensions within the community, serving to further polarize competing views and silence the middle, impeding the possibilities of meaningful conversations that could result in cooperation, compromise, and change. Such moments of heightened intensity may be viewed as early indicators of corrosive community. This same oil and gas operator captures such a moment as he recalls being offended by an activist's remarks at a city council meeting:

> I do understand their viewpoint, I just don't agree with their viewpoint. And there is no way to talk to them. One of the guys, ex hippy guy that got up, he was mentioning, "we are not against industry, we are for children."…It's like I got a boy that just eagled out and the project was a donation to the city of [omit] to add play equipment at [Local] Park…but you know we don't care for the children, we only care for the industry [sarcastically].

The local industry owner notes that the activist's statement implies that industry is not "for children" if they are "for oil," a suggestion that he found highly offensive. Industries supporters tend interpret such remarks as simply "propaganda," to which the best public response is commonly no response at all. Even though they may talk among themselves about their frustrations with such individuals, it is typical for stakeholders in this study to meet the opposition with silence rather than risk getting upset and engaging in an argument.

Several local scientists who claim to be neutral and objective researchers, recounted similar frustrations when dealing with the public at a particular community education forum, referring to some of the audience members as "there to teach us." One of the scientists explains:

> It's a mix of sense and nonsense, and so if we can move them to the fact side we have done our jobs. Sometimes when we move them to the facts side it makes some of them angry because they think we are proponents of it, but we can go the other direction just as well….[but] anytime you get a large group like that, intellectually, there are going to be people that you are not going to penetrate or convince or help them to see the myths that they might have bought into, and so there were several people that we had to ignore in the audience…

This response is rather common as many stakeholders choose to avoid the topic altogether in order to maintain the peace, rather than engage in a battle they either feel they can't win or don't have any control over. The data demonstrates that this response also filters down to the individual level amongst primary friend groups, as even a local activist, who has spent considerable time trying to raise awareness within the community of the dangers associated with hydraulic fracturing, reports choosing her battles carefully amongst colleagues and friends. "I've erred on the side of saying less than I actually want to a lot of the time…" Overwhelmingly the narratives demonstrate that withdrawing from the conversation is the preferred response for stakeholders in

the case study community from across the cultural capital spectrum. Nearly half (45%) of the interviewed stakeholders specifically mentioned either avoiding the topic with family and friends who share an opposing view, only discussing concerns with like-minded individuals, or having some generic version of the conversation with relatively apathetic parties. Nearly half (40%) of these stakeholders were native to Oklahoma and fall into the pro-development cultural capital group. While culture may explain this response to some degree, living in a small town is another important factor worth considering. Because social networks probably overlap quite extensively in many cases, stakeholders may find themselves withdrawing as a way to preserve their networks, especially since more than half (55%) of the stakeholders in the sample specifically mention having friends or family members working in the industry. This proportion encompasses stakeholders who express a variety of views on this topic.

Evidence of network ties to friends and family members who work in the industry emerge in a variety of ways. One stakeholder states, "I'm probably not going to have a discussion about fracking with some of my family members, because why get into it?" Another stakeholder expresses similar reasoning:

> Even my own family, my sister… "well this is great for the economy, this is exactly what we want to see," and they have a son in law that works for Devon and "he's up in coming in this great industry," I don't see that at all. But when I hear them talk about it I just shut down. What can I say that's going to change their minds?

This stakeholder also goes on to discuss feeling pressure to self-edit on social media:

> The first time I put something on social media was the first time I realized how much it affects my friends and their families. They have husbands who are in the oil and gas industry and that's how they make their money. Seeing them comment on how they have lost their jobs, and how much their families have suffered from it, and how they have come to rely on that, so…I had to back off there too.

Others make statements like, "I've kind of separated myself from it because I don't even want to think about it," and "My family wouldn't talk about it, it's just not something that you would [discuss]." In fact, most stakeholders believe that engaging in such a potentially heated conversation with family, friends, and colleagues is simply not worth having since minds are unlikely to change, and that attempting to influence others may do nothing more than damage social ties. One stakeholder explains how it is tacitly understood that no one is to openly criticize the industry in her church community because a member's daughters recently took a job in the industry. She explains:

> I think that when you have people that work in it, it makes the conversation different because you are somehow attacking their child's career choice if you don't agree with the effects of that industry…the defensiveness is crazy

On the other end you have some industry workers who feel this pressure when non-industry friends or family members inquire about the safety of their work. One local oil and gas worker discusses his frustration with having to explain his job:

> I really don't enjoy the conflict with people. Even friends you know, that are like "hey I think this is actually really bad." And then you know we discuss it…that's just not my favorite part, when you talk to people and you feel like it is very technically sound but they might not… if they really looked into it and heard a lot from the media…they'll be less convinced, I think, because I work for an oil and gas company. You know they are like "well, you're getting paid by them so I can't fully trust you." Which, I get. I understand.

On both ends of the spectrum it is evident that once one perceives that someone is resistant to the information that they are presenting there is no way in which communication with that individual can continue. That it is simply not worth the time to argue when someone is unwilling to hear them out, suggesting that their expertise is not valued in some way, or is deemed not credible. Another oil and gas employee explains his frustration:

> …she [Mother in law] has absolutely no practical knowledge of it, so it's been interesting. You just can't bring it up around her, she has already made up her mind. It's just though because these people are just ignorant, and it's

> understandable because like I've only been working full time since I've graduated [recent months], and I still have so much to learn. It's complicated

This tacit social withdraw from the topic may be a peacekeeping strategy for many, but it doesn't make the tension any less palpable. It is more likely that this strategy has resulted in a sort of silent looming tension that hangs over many in the community, similar to the type of unspoken tension that occurs between friends who temporarily quit speaking to one another after an intense argument. Evidence of the proverbial elephant in the room emerges as stakeholders across the spectrum have referred to their interactions as being largely "civil," while referring to the environment as being "hostile." A local activist describes how this hostility manifests in her "Anti-Fracking" signs being repeatedly stolen and vandalized on her property:

> I had several signs stolen or kicked over or pulled out and thrown on the ground, and eventually we sort of tried to reinforce the sign a little bit. That was all my husband, he did all sorts of unspeakable things to the sign to try and make sure that it would stay in the ground…It was partly why we moved from that house to an apartment…I felt like somebody was walking past my house and just regularly angry with me and taking out their anger on something in my yard. And that was very uncomfortable

Another local activist remarks that one of the other core organizers of the anti-fracking grassroots organization "has three times now, after a city council meeting, found a three inch screw screwed into the side wall of the tire on her truck." This stakeholder goes on to also depict the hostility as the way in which activists are depicted or portrayed within the larger community context. This stakeholder explains, "…activists can be a dirty word in this environment…. so I think that it [the term outside agitator] is used purposefully to create distrust in the communities were activists are trying to organize." Another activists describe how she believes the industry is out to discredit anyone who speaks out against them:

> There are people who are paid to make them [those speaking out] look stupid, and tear down any kind of argument they're making or wait for the moment when they miss-speak and just be like, "look, this person has no credibility. They don't know what they're talking about. They're just an uneducated crazy person.

While both activists see the community as being hostile towards activism, or at least towards residents who actively voice their concerns toward industry practices, a local oil and gas operator experiences hostility as groups within the community want to shut down the source of his livelihood. He sees such individuals as anti-oil and gas, as outsiders who moved here for work and who want to change the community that he grew up in and has been a part of his entire life. This stakeholder explains, "These are people that don't have the same history in [this community], they have moved in from out of state to take a job somewhere, and we've been here…I mean I went to high school here." This person harbors intense resentment of those who he perceives are threatening his livelihood, and also for compelling him to get up and speak at various public forums when he is largely uncomfortable speaking in front of crowds. He explains:

> I work with inanimate objects in the field, I have more cows around me than I have people most of the time because I'm working on a well, right? These people, they are used to being in front of classes and public speaking. I don't like public speaking, especially when I feel like the situation is hostile.

For him hostility is making him have to justify his livelihood to a room full of concerned citizens and anti-oil and gas activists, so that people who do not have extensive knowledge of oil and gas production potentially determine the fate of his business interests in the case study community. This stakeholder describes having pride in producing something of such great societal importance, and that many of the same people who would like to see oil and gas production replaced with renewable sources of energy, simultaneously use and demand products that are derived from oil. He explains:

> ….all the while people are using their plastic electronic devices, rubber on their tires…everyone is persecuting you for supplying something to them that they demand. They demand it! I just think there is a lot of hypocrisy there.

Tensions often go beyond dissenting points of view on the technical aspects of oil and gas production, as accusatory language such as "industry collusion," or "outside agitators" are taken as personal attacks that are internalized and engender resentment towards those who have

made such remarks. A local scientist who studies aspects of oil and gas risks explains how claims that he has been colluding with the industry are taken seriously:

> I don't like that. When someone questions your integrity, that's serious. That's really serious. But at the same time it's so ridiculous that it's laughable…but hey we've got a reputation.

A city official active in the local ordinance process also describes being personally attacked, stating:

> They said a lot of things about me, as an elected official that works for free…you know I do this because I care about our community, and so when somebody blasts you on social media because they think you don't care about a community or you don't care about kids or all you care about is money in your pocket, that's tough to listen to.

On the opposite end of the spectrum some community members feel as though the industry, and industry sympathizers, get a free pass to do whatever they want due to the economic importance of the industry within the state. The following statement typifies this perspective:

> The way the companies just seem to have the ability to come in and do whatever they want, tear out whatever they want, get access to whatever they want, I find disturbing. The way it just seems like they can do whatever they want.

A local activists explains how those on the other end of the spectrum also use this kind of accusatory language, stating, "…a lot of the folks that we are working against, particularly in the city council situations and things like that, they like to call our patriotism into question, they like to paint us as hyper emotional over reactors."

It is clear that several social fault lines exist within the community regarding local oil and gas activity. It is much easier to identify the more extreme ends of the cultural capital spectrum. Perspectives do overlap in the form of individuals who likely share closer ties to those on both ends. This mediating group is far less visible since they don't appear to be well represented in the public forums, which is probably the result of not feeling strong enough either way to voice their perspectives, or not wanting to openly make statements that could damage their reciprocity

networks. The most common peacekeeping strategy used by stakeholders from across the spectrum appears to be withdrawing from the conversation with those that are perceived to be less receptive to their personal point of view. Other responses include reducing the interaction to something more superficial if it can't be avoided, or to retreat to a group of like-minded individuals in order to express how one truly feels about the issues. When individuals from more extreme ends of the spectrum do come into contact with one another it often gets heated quickly, resorts to accusatory language, and sometimes devolves into personal verbal attacks. Such occurrences may be treated as indicators of early signs of corrosive community. If a technological hazard event ever were to occur it is likely that the seams between these views would be the first places to rupture.

CHAPTER VI

COMMUNITY CAPITALS FRAMEWORK IN APPLICATION

The community capitals framework proves to be useful for analyzing communities impacted by oil and gas development. While this study did not focus on all seven capital categories, all did emerge in one way or another throughout the interview process. For the purpose of this study, four (political, cultural, natural, social) of the seven community capitals were most useful, with the cultural capital and social capital being the most prominent.

Beginning with the community context, the atmosphere in which oil and gas activity was taking place had already become highly politicized at the time of the interviews. According to Flora and Flora (2008) political struggles generally play out in a three-way negotiation process between the market, the state, and civil society, and that in general political capital reflects the dominant cultural capital of a community. In Oklahoma, industry representatives and state officials were working at the state level to create legislation to limit municipal authority over oil and gas development, at the same time many residents and activists of the case study area worked at the municipal level to pass a zoning ordinance. The market demand for oil and natural gas has allowed the oil and gas industry to gain substantial power to influence politics, as their activity has historically made up a considerable portion of the state's economy. The oil and gas industry in Oklahoma may constitute part of what Flora and Flora (2008) refer to as a hidden power

structure. That is, individuals or groups who are not elected, and who often have the most financial capital, possessing the power to influence official matters.

Flora and Flora (2008) state that multiple cultural capitals may exist within any given community, and that the dominant cultural capital if often a reflection of the group having the most political capital. It may be argued that while a battle over zoning occurred at the local level in Stillwater, the real battle occurred at the state level during this time. The data suggest that multiple cultural capitals do exist in the case study community. However, while the pro-conservation group was the slight majority of stakeholder sample, the dominant cultural capital in the state is the pro-development group. This explains why the pro-conservation group had such a difficult time having their concerns reflected in local laws and state legislature despite appearing as a slight majority in the case study community. The dominant ideology combined with the extensive social networks within a small community seems to explain why so many native Oklahomans held the experienced view of hazard response and expressed no serious health concerns, regardless if they were pro-conservation or pro-development. Thus, the political economy of Oklahoma plays a central role in influencing the dominant culture, while creating much of the oil and gas milieu in the case study community at the time of the interview process.

Mazur states, "In a technical controversy that has become politicized, people's political ideological stance usually predicts their support or opposition to an ostensibly unrelated technology" (2014: 6). A technological disaster or significant emergency situation has yet to occur in Stillwater. A relationship between a stakeholder's view of natural capital, their confidence in hazard response, and the way in which stakeholders construct risk related to oil and gas development does exist. The findings in this study support prior work asserting that differences in risk perception are more strongly related to personal values and beliefs rather than differential information levels, as stakeholder perceptions varied in relation to ideological views of nature and science while most stakeholders report high levels of process comprehension

(Fruedenberg 1993; Kroll-Smith and Couch 1993). Identifying the fundamental differences in the way stakeholders value natural capital and trust oil and gas technology helps to illuminate the location of multiple social fault lines within the community.

Following up on Ladd's (2013) suggestion that communities with a history of extraction are likely to view oil and gas activity more favorably, this study finds that while there is evidence of cultural influence on stakeholder's perceptions of the oil and gas industry, additional complications emerge when property rights and quality of life issues are considered. In short, a community's history with extraction may have an influence on the political capital of a community at both the local and state levels, and to the degree that individuals who hold those views do not feel they have been directly, and negatively, impacted by nearby oil and gas development. Although some individuals who own mineral rights and surface land may view receiving royalties as hitting the lottery, others do not feel as though monetary compensation is equivalent to what is lost. While a community's history may influence the dominant culture of an area, it is also important to consider the existence of competing views present in the community. This is especially important when considering competing views as a source of tension and social strain. Understanding the degree to which conflicts are present may help illuminate social fault lines within a given community.

Competing cultural capitals are not mutually exclusive as many stakeholders occupy positions that represent overlapping views and beliefs, essentially representing a continuum of perspectives in which the framework simply aids with understanding the more dominant ideas present in a given community. It is possible that stakeholders hold close ties to individuals and groups on both ends of the spectrum, thus contributing to their uncertainty of which information is true and whose views make the most sense. Such stakeholders potentially serve to assuage tension within the community as they may create a sort of social buffer between competing perspectives. Stakeholders who fall into clashing cultural capital groups appear to view the

stakeholders at opposing ends of the spectrum with mutual suspicion, and commonly choose to avoid conversing about controversial issues as their incongruent ideas tend to easily devolve into personal verbal attacks. Emerging tension manifests itself in the commonly used description that public interactions between competing viewpoints were "civil," while describing the environment as "hostile." This study suggest that the choice to withdraw from conversations addressing controversial issues is the popular choice, however, the few moments of intense emotion laden responses that emerge may indicate early signs of corrosive community. Based on the existence of early corrosion, it is likely that if an emergency event or technological disaster were to occur extensive social implications would follow.

It is not possible to estimate the extent of social damage in the case of a hazard event, yet one can observe the existence of claims and counter claims at various points in the narratives. Perhaps most importantly, patterns within the health conscious minority indicate that some stakeholders are beginning to grow increasingly suspicious of seemingly normal patterns of illness and allergies within the community. As of right now such claims largely remain latent, but would likely be amplified if some sort of highly visible accident were to occur. In addition to the existence of multiple silent health claims, the evidence of pro and anti-industry rhetoric, as well as the handful of personal insults commonly observed at city council meetings, provide several examples of much broader claims and counterclaims currently at work in the case study community. Because the common response to this tension is silence, claims and counterclaims tend to go virtually un-vocalized, making most interactions regarding these issues *appear* "civil," while the harboring and knowledge of such counterclaims make the larger atmosphere *feel* "hostile." Thus, while everything may appear copasetic, a silent tension looms over the community, as intense feelings toward such issues appear to be boiling under the surface.

CHAPTER VII

CONCLUSIONS

Competing political capitals at the state and local level contribute to the politicization of oil and gas activity along ideological lines in the case study region. In this study I demonstrate that cultural capitals may be partially constructed by understanding the ways in which stakeholders value natural capital, as well as their confidence in hazard response rooted in personal knowledge and experience. According to Kroll-Smith and Couch, "Civility is not independent of a community's relationship to the biosphere," therefore the cultural capital groups represent more than simple differences in perception, but the existence of competing belief systems surrounding oil and gas development and how one views nature in general (1995:378). Identifying competing cultural capitals allows researchers to illuminate the location of various social fault lines within a community, as well as the social capital networks that assuage tensions by acting as a buffer or bridge between competing perspectives. Narratives of clashing cultural capitals and evidence of claims and counterclaims within the community indicate increasing tension, if not early signs of corrosive community.

Kroll-Smith and Couch (1991) suggest that beliefs influence the believer far more profoundly than perceptions influence the perceiver - as beliefs are internalized and take far more information to modify and little evidence to reinforce. This study finds some evidence for this as many stakeholders viewed perspectives different from their own as "ideological" and believed

others already "had their minds made up." In Stillwater, stakeholders typically chose to withdraw from the topic altogether because they think engaging in such a debate is futile since there is no information or argument that they can make to convince someone to change their mind. Research on contaminated communities suggests that the tacit withdrawal of Stillwater stakeholders may not be unusual. As Kroll-Smith and Couch state, as belief in contamination intensifies, believers begin to withdraw from their normal support networks and form groups of their own, together reaffirming one another's fears, "developing a set of cognitive and emotive assumptions about danger that place them farther outside the boundaries of ordinary community life" (1991:64). Furthermore, people who define the problem at worst as a warning, or not a problem at all are likely to begin viewing believers and their emergent groups as threats to property values or jobs (Kroll-Smith and Couch 1991:65).

Evidence of increased hostility and social breakdown emerged in Stillwater, as an activist's claims of child endangerment were internalized by some industry employees as ridiculous and infuriating. The claims informed a political process impacting livelihoods. Reports of anti-fracking signs being stolen and vandalized, screws being found in the side walls of tires after city council meetings, and one mother's claim that kids at school said they can't be friends with her child anymore "because of what your mom said [publicly]," are all behaviors not uncommon to contaminated communities. In cases such as Yukon, Pennsylvania, Minden, West Virginia, and Centralia, Pennsylvania, people changed where they went to church and shopped for groceries because they believed the community to be a "hostile" place. Activist's cars were vandalized with swastikas, and parents even withdrew their children from Girl and Boy Scout chapters because they were led by people with different beliefs than their own (Kroll-Smith and Couch 1995:382). Although Stillwater cannot be classified as a contaminated community, the politicized climate surrounding oil and gas production appears to have given rise to milder symptoms similar to communities who have suffered from various forms of contamination. The

interesting thing about this study is that there is evidence that no event actually has to occur for polarization and politicization to occur. However, it could be argued that the spike in seismic activity and its role in politicizing this issue may very well be factors in beginning this process.

Numerous studies from disaster research demonstrate that when technological hazards become emergency situations, communities face considerable adverse consequences such as health problems, psychological stress, social corrosion, ongoing litigation, and loss of political and institutional trust (Short 1984, Cuthbertson and Nigg 1987, Kroll-Smith and Couch 1993, Freudenberg 1993, Freudenberg and Gramling 1994, Gill 1994, Gill and Picou 1998, Tierney 2014). However, this study observes similar patterns in a community in which technological hazards are simply present. Such evidence demonstrates that when technological hazards become politicized their mere presence may bring about symptoms similar to contaminated communities well before the occurrence of an emergency event. Similar applications of the community capitals framework offer a systematic approach to compare and contrast affected communities, while also informing authorities of better ways to prepare future mitigation initiatives. Authorities may guard against corrosive community by simply gaining a better understanding of the differing beliefs present in a community, working to craft explanations and provide information more satisfying to those varying belief systems. A blanket approach to increasing communication with residents living in close proximity to oil and gas operations, informing stakeholders of the actual degree of risk they face, as well as making response plans easily accessible for the public may not be as effective for individuals with solidified beliefs about the threats or lack thereof. Therefore, more straightforward technical explanations may assuage fears for some groups, while more empathizing approaches appealing to emotional concerns and associations of the threat may be more impactful for others. Caution and effort to communicate should be taken for those who believe they have been negatively impacted. Multiple stakeholders in this study express that simply being kept in the loop would have eased their minds since most of their stress stems from

the unknown, even those who went on to state that their minds would not have changed either way, they would have at least felt less anxious about what was going on around them. Industry operators and local authorities should work to increase communication and educational resources to all stakeholders within relative proximity to such operations in the future, working to reach out to those that feel heightened levels of fear related to activities, keeping them informed along the way. By getting ahead of, and staying reasonably on top of individual concerns, municipalities and industry may be able to better negotiate reasonable mitigation strategies and avoid potential political turmoil and litigation.

Ladd (2013) finds that stakeholders in his study feel that economic benefits outweigh concern, ultimately suggesting that stakeholder residing in "energy patch" states may view such methods of production more favorably. Most stakeholders in this study, however, do not feel as though the economic benefits outweigh the concern despite being located in an "energy patch" state. This is likely due to the fact that the stakeholder sample in this study is highly educated and not directly dependent upon the oil and gas industry for employment. A more typical rural community in Oklahoma may more closely resemble the stakeholder sample in Ladd's (2013) work. It is also commonly reported that water usage and fears of contamination are amongst the greatest concerns of residents located near oil and gas operations (Kriesky, Goldstein, and Beach 2013, Heuer & Chih Lee 2014, Stedman et al 2012, Theodori 2009, Theodori 2013, Ladd 2013, 2014), although earlier findings are supported in this study, stakeholders are more concerned with property rights and quality of life issues. My findings suggest that a careful consideration of a region's political economy and the existence of multiple cultural capitals can allow researchers to gain more nuanced insights into individual communities.

Future research should pursue more in-depth qualitative methodologies in order to better inform researchers of the unique concerns and challenges different communities face, while allowing for cross comparison possibilities. Researchers should follow this study with an

application of the community capitals framework to communities that have experienced well blowouts, surface spills and various other forms of oil and gas related accidents, exploring aspects of corrosive community and the nature of normal accidents. I suggest continuing to explore the application of the community capitals framework and concepts from ethnolographic hazard research perspectives. The community capitals framework has proven successful in this case, but other theoretical frameworks examining culture or social networks may also prove to be valuable contributions to the literature. Finally, I encourage researchers to explore the terminologies used to address various dimensions of resource extraction to better understand the meanings and rhetoric that emerge in discussing controversial technological processes.

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